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Corporation of Glasgow



Municipal Enterprises

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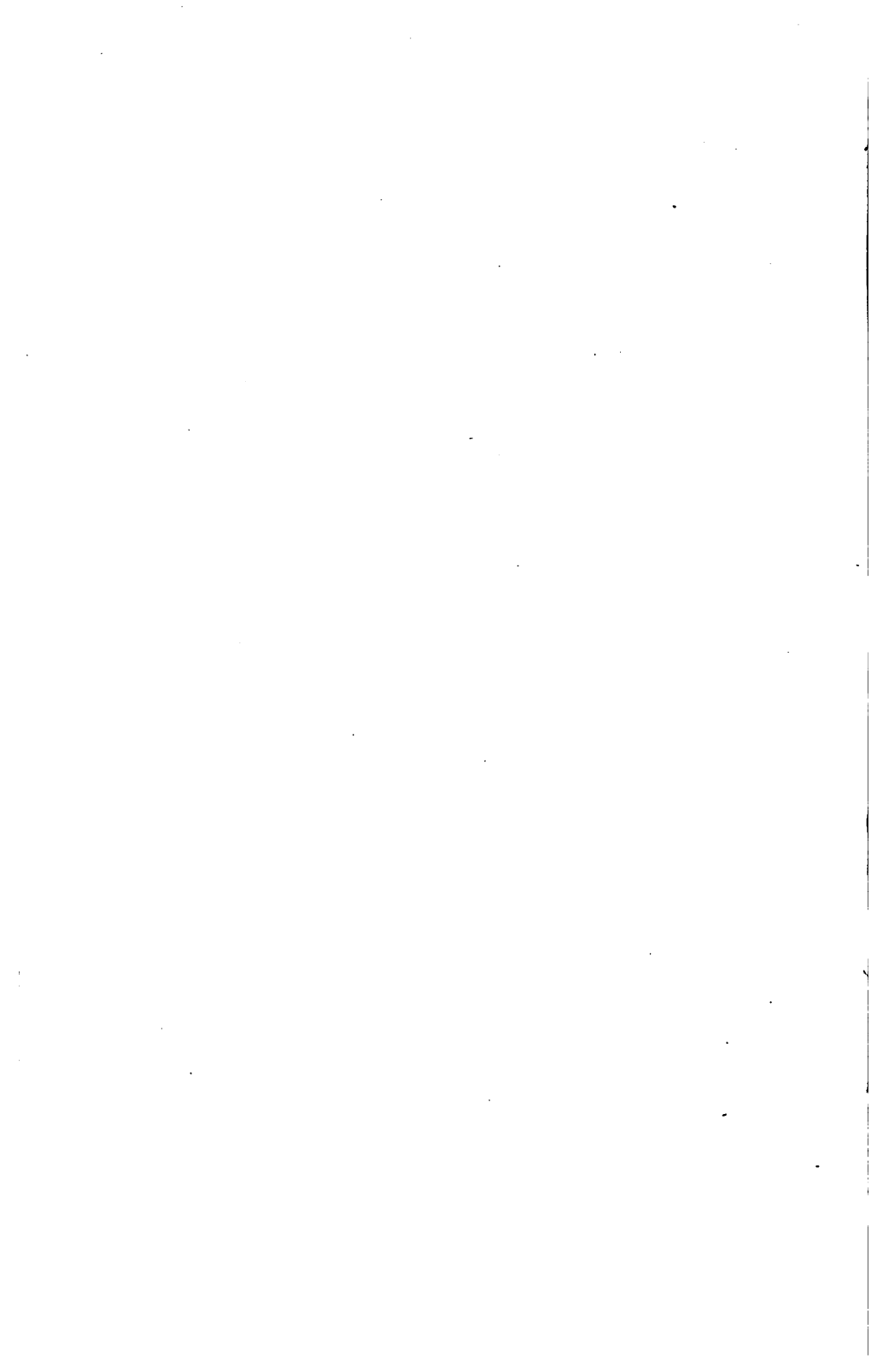
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Handbook

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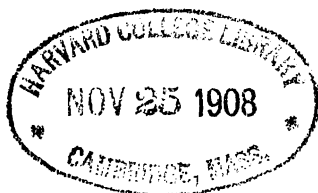


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INTRODUCTION.

THIS Handbook was primarily prepared for the Members attending the Sanitary Institute Congress held in Glasgow in July last. It was felt, however, that the information it contains regarding our civic government was of more than passing interest, and might be useful to visitors to Glasgow, more especially as the administration of our City and its municipal development has been the subject of critical investigation and enquiry all over the world. The want has often been experienced of such a compendious handbook as that now presented, which would convey, in an interesting and intelligible manner, the salient features of progress in the various departments of civic enterprise, for, unlike many American cities, Glasgow does not issue an annual report covering the work of the municipality for the twelve months preceding, but each individual enquirer is left to glean such information as he desires from the printed minutes and accounts of each department. This is not altogether satisfactory. The meeting of the Sanitary Congress was accordingly taken advantage of to deal with the municipal enterprises in a somewhat elaborate and extended form, so that, for some years to come, this volume might be a convenient medium for satisfying the enquiries of various correspondents in search of information on the matters with which it deals.

I esteem it a very great honour to have my name associated with this publication, and my earnest hope is that it may not be found uninteresting to the stranger into whose hands it may come, and that it may serve the purpose for which it has been prepared.

JOHN URE PRIMROSE,
Lord Provost.

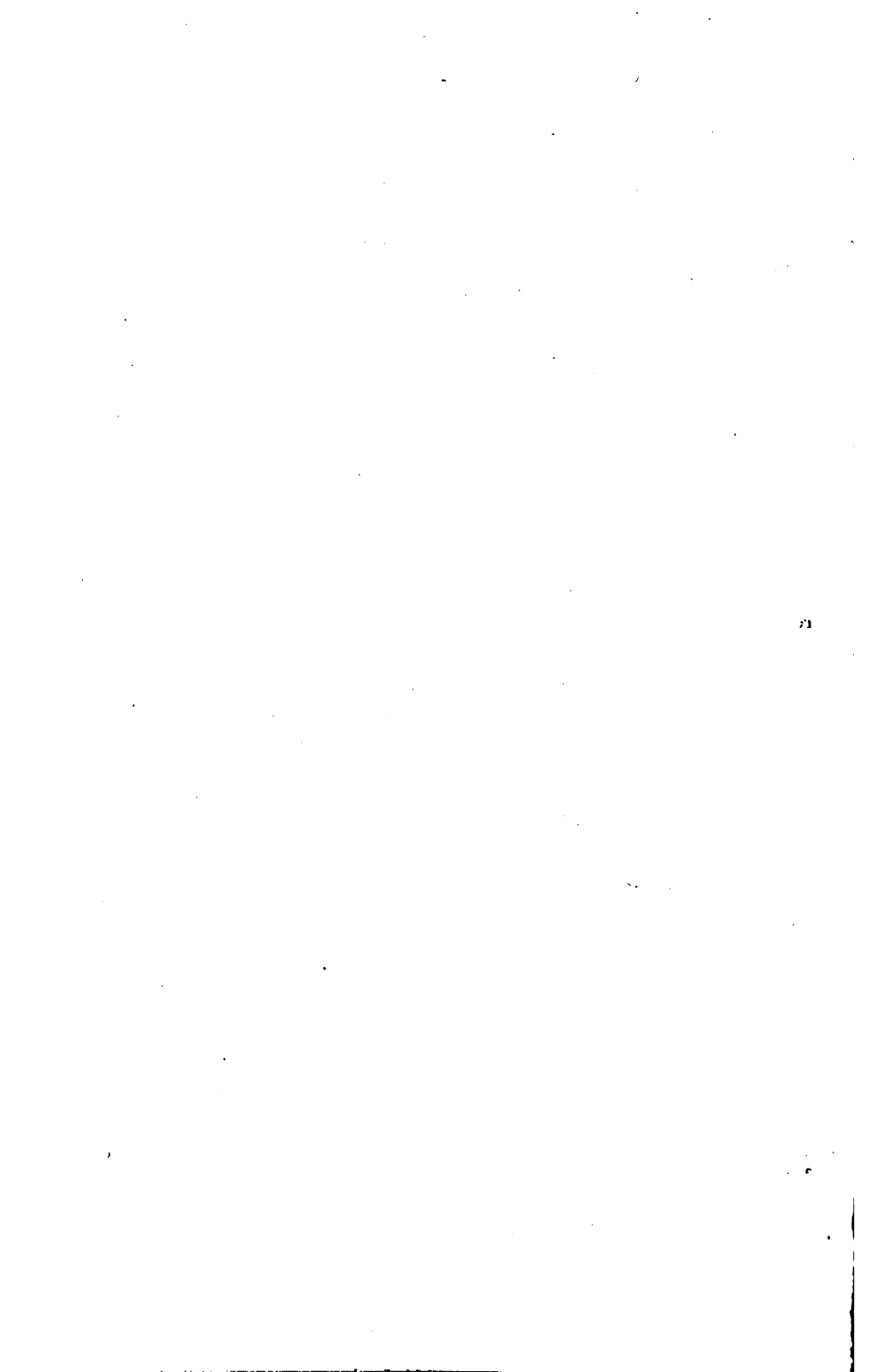
CITY CHAMBERS,
GLASGOW, *November, 1904.*

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THE MUNICIPAL BUILDINGS.



THE CORPORATION OF GLASGOW.

HISTORICAL INTRODUCTION.

WITHIN the necessarily brief compass of an introductory sketch dealing with Glasgow as a city, it will be possible only to indicate in the most general terms the forces which planted the city where it is, and the causes and conditions under which it has developed from a small village ruled by ecclesiastical authority into one of the great municipalities, and one of the foremost industrial and commercial communities of the world.

The greater part of the area over which the busy streets of Glasgow now extend was, at the period of the Roman occupation, covered by the waters of the Clyde estuary. That fact is amply attested by geological evidence, as well as by the numerous remains of dug-out canoes which have been found in the ground at various localities throughout the city. And further significant and conclusive evidence of that condition is afforded by the Roman bowl of so-called Samian ware which was found, in 1876, at a depth of 4 feet 6 inches, in the Fleshers' Haugh, Glasgow Green.

Primitive Glasgow, however, must have clustered around the high ground which came to be the site of Glasgow Cathedral. Visible from that position was the great Antonine wall built by the Romans as a bulwark and boundary of their dominion, and it was not long after they withdrew their forces till Glasgow first faintly emerged from the mists of antiquity. From the heap of monkish fable and legend which smothers the memory of St. Kentigern it can be deduced with certainty that, about the middle of the sixth century, a missionary apostle made Glasgow the seat and centre of his evangelising activities. Though the Episcopal dignity of St. Kentigern—or St. Mungo, as he was also familiarly called—was but shadowy, and the limits of this See must have been ill-defined, yet the reverence in which his person is held in the Catholic Church, and the way in which his name and deeds bulk in monkish chronicles, indicate the deep impression his life and service made. It is not till the lapse of more than five centuries from the days of St. Kentigern that Glasgow really comes into historical light, and begins to occupy a distinct place in Scottish records; and again it is in its ecclesiastical relations that the city appears. In, or shortly after, the year 1116, the See of Glasgow was revived or established anew under a deed termed "An Inquisition of David, Prince of Cumbria," during the reign of that prince's brother, Alexander I. This inquisition or memoir of Prince David—"the sair saunct" for the Scottish Crown—sets forth the foundation of the Church in Glasgow, and the ordination of St. Kentigern as Bishop of Cumbria. It maintains he had many successors in the See, but the revolutions and the troubles in the country destroyed the Church and almost effaced Christianity. The document next narrates the restoration of the bishopric and the appointment of John Achaius, the prince's tutor,

as first Bishop of Glasgow. It then proceeds to give, on the evidence and oath of five *juratores*, a list of the territorial possessions of the See, which were both numerous and widespread. Thus were the foundations of Glasgow laid in missionary enterprise. Its primitive activities centred around the spiritual welfare of a widespread district, and there was reason for the motto which at a later date was chosen for the city—"Lord, let Glasgow flourish by the preaching of Thy Word."

The seat of an episcopate so richly endowed would quickly draw round it a certain population, partly from the occupation its clergy afforded and partly attracted by the protection of life and property secured under the shadow of the Church. Fifty years after the founding of the See, the powerful ecclesiastic, Bishop Joceline, in or about the year 1176, obtained for himself and his successors for ever, from William the Lion, the grant of a burgh with a weekly market. Again, in 1190, a supplementary charter was issued in favour of Bishop Joceline, granting to him and his successors a fair at Glasgow, to be held every year full eight days, with all the liberties, provisions, and rights granted to fairs throughout the King's dominions. For more than seven hundred years Glasgow Fair has been unfailingly observed annually, under circumstances and conditions greatly changing with the changes in the social and economic growth of the country.

A cathedral was erected or reconstructed by Bishop Achaius on the eastern part of the site to this day occupied by the Cathedral of Glasgow. The sacred building was consecrated in the year 1136, in presence of its saintly founder, David I., who now occupied the throne of Scotland. The Cathedral, we may assume, was but a modest building. Forty years later it was burned to the ground, and it is believed that no trace of the original structure now remains. To the zealous and energetic Bishop Joceline fell the task of again beginning the work of erecting Glasgow Cathedral. His labours were so far advanced that in 1197 a portion of the structure now represented by the lower church or crypt was consecrated with due splendour and solemnity. To Joceline, therefore, Glasgow owes its burghal constitution, the institution of its markets and fair, and the foundation of its great church. Till almost the dawn of the Reformation the Cathedral continued to grow and be added to, one of the most active improvers having been Robert Blacader, first Archbishop, whose period of rule extended from 1484 till 1508. After the Reformation the structure, under the charge of the Town Council, was used as the Protestant Parish Church of Glasgow. About the end of the sixteenth century the Crypt or Laigh Kirk was appropriated for the Barony or Landward Parish of the City, and continued to be so occupied for two centuries. And at a later period, in 1648, accommodation was found for a third congregation in the nave of the Upper Church, which was for this purpose separated from the choir by a dividing wall. This, the Outer High Church, continued till 1835, when the scheme for renovation of the entire structure necessitated its removal. The Town Council accordingly provided a new church, called St. Paul's, and to that the congregation was transferred. Since that period only one congregation—the Inner High Church—continues to worship within the walls of the Cathedral. The "renovation" work undertaken by a body of patriotic

citizens in the first half of the nineteenth century gave rise to much hostile criticism and bitter reproach. In particular, the removal of the western tower and the consistory house, with the practical reconstruction of the western façade, were deeply lamented. The agitation resulted, in 1849, in the resumption of property by the Crown, and the recognition of the Town Council as mere custodiers and conservators of the building. In 1857 the whole control of the building was taken over by H.M. Board of Works, and the rights and duties of the Corporation are now restricted to the pews and furnishings of the portion of the structure devoted to public worship.

Provided thus with kirk and market, the city went on its modest way for the first half of the fifteenth century. Then came the next epoch-making event in its career—the foundation of the University. In 1410 St. Andrews had secured a Papal Bull instituting a University in that eastern city, and what St. Andrews was to the East, Glasgow aimed at being to the West. Accordingly, on the representation of the then Bishop, William Turnbull, James II. secured, in 1450, from Pope Nicholas V., a bull authorising the erection of a University in the City of Glasgow, “being a place well suited and adapted to that purpose, on account of the healthiness of the climate, the plenty of victuals, and of everything necessary for the use of man.” The government of the new seat of learning instituted by the Pope was, of course, placed in the hands of the Bishop for the time being. Teaching at first began in the crypt of the Cathedral, but the new institution grew in prosperity, and a separate building—the Auld Pedagogy, in the Rottenrow—had to be allotted for college purposes. Again, within a few years, another removal was made to the east side of the High Street, when the New Pedagogy was erected, and on that site, with additions, the College remained till our own day. The Reformation agitations practically ruined the University, but during the minority of James VI., in 1577, a Charter of *Nova Erectio* was obtained, under which it was re-established, this time on a Protestant basis. The buildings in the High Street, which continued to be occupied until 1870, were erected by subscription about 1630 to 1640. The front to the High Street remained as part of a railway station building a number of years longer. From the winter session 1870-71 the work of the University has been carried on at Gilmorehill, and that noble and spacious site promises soon to be too cramped for the lecture rooms, laboratories, and hospital buildings which continue to be steadily added, with the increasing demands of modern education.

Of the external circumstances which affected the fortunes and fate of Glasgow, none was fraught with greater issues than the discovery of America. Hitherto the city had occupied a position on the western rim of civilisation. It was far removed from the great centres of mediæval commerce in a thinly-peopled land, on a shallow river, which led out to only a wild and lawless people, who preferred the practices of Rob Roy to the ordinary rules of commercial intercourse. Beyond was the great untracked sea which was supposed to bound the world. The voyage of Columbus and his associates altered all that, and at once changed the geographical position of Glasgow. Instead of being on the extreme

limit of human activities, it was henceforth on the highway of the great inter-continental traffic which was bound to grow up with the peopling of the American continent. The significance of the discovery was not at first obvious to the inhabitants of Glasgow. Slowly the tide of population crossed the Atlantic to take possession of the new land, and the ocean traffic was at first jealously guarded and retained by southern, and at that time more venturous, nations. But the vast continent afforded room for all, and in the fullness of time Glasgow abundantly reaped the advantages due to her changed geographical relations.

The City of Glasgow did not get rid of the last traces of ecclesiastical domination till the year 1690, when a charter was signed by William and Mary, subsequently ratified by Act of Parliament, granting to the Town Council full power, right, and liberty to choose and elect their provost, bailies, and other magistrates as freely as any other royal burgh in the kingdom. The loyal and enthusiastic support given by Presbyterian Glasgow to the Protestant succession was thus rewarded with rights for which the citizens had striven for more than a century and a-half. During the period of Roman Catholic control the powers of the ecclesiastical authorities had steadily expanded, and the municipality was entirely under their domination. In the confusion which ensued on the Protestant Reformation, the magistrates attempted to assert their independence, but the temporalities of the See, including the hereditary right to the nomination of magistrates and the regality and justiciary of the city, were reserved and disposed of by the Crown. Bit by bit certain privileges of election were conceded to the Town Council, but it was not till the Charter of William and Mary was signed that Glasgow can be said to have attained the full status of a royal burgh.

To realise the aspect of Glasgow in the sixteenth and seventeenth centuries, one must imagine a city not unlike St. Andrews of the present day. About the middle of the seventeenth century, when its population amounted to nearly 15,000 souls, the city was visited and most favourably commented on by several emissaries and travellers from the south. Commissioner Tucker, in his Report on the Excise and Customs of Scotland in 1656, says—"The towne, situated in a pleasant and fruitful soil, and consisting of four streets, handsomely built in the forme of a cross, is one of the most considerablest burghs of Scotland, as well for the structure as the trade of it." In the euphuistic language of his period, the florid Francks, in his *Northern Memoirs*, written in 1658, describes Glasgow as "the non such of Scotland, where an English florist may pick up a posie;" and, coming to particulars, he thus notes certain of its beauties—"Now let us descend to describe the splendor and gaity of this city of Glasgow, which surpasseth most, if not all, the corporations in Scotland. Here it is you may observe four large fair streets, modell'd, as it were, into a spacious quadrant; in the centre whereof their marketplace is fix'd; near unto which stands a stately tolbooth, a very sumptuous, regulated, uniform fabrick, large and lofty, most industriously and artificially carved from the very foundation to the superstructure, to the great admiration of strangers and travellers. But this state-house, or tolbooth, is their western prodigy, infinitely excelling the model and usual build of townhalls; and is, without exception, the paragon of

beauty in the west; whose compeer is no where to be found in the north, should you rally the rarities of all the corporations in Scotland."

By slow degrees, Glasgow was, in the later part of the seventeenth century, becoming a city of commercial importance, and forging its way to a leading position among the communities of Scotland. The spirit of enterprise and the growth of wealth among the merchant class induced them to take heavy stakes in the ill-fated Darien scheme, which for a time demented and then nearly ruined the nation. The outlet the merchants of Glasgow sought disastrously through the Darien enterprise came to them in a safer and saner manner through the Union of the Kingdoms in the year 1707. The effect of that great epoch-making event on the commercial development of Glasgow was both powerful and immediate. And yet in no part of Great Britain was the beneficent Treaty of Union more bitterly execrated and denounced than in Glasgow, although no town in the end reaped greater advantages from its operation. Sentimental considerations, however, ruled public opinion. It was felt that national independence was at stake, that poor auld Scotland was to lower its neck under the heel of the auld enemy, that the nation would be impoverished by the removal of all men of wealth and influence to London, and so on. At the Cross of Glasgow the proposed Treaty was burned amid cheers of the mob, who then stormed the Tolbooth, pillaged the dwelling of the Provost, and for several weeks took possession of the town. And within a few years afterwards Daniel de Foe, writing of Glasgow, says, "The Union has, indeed, answered its end to them more than to any other part of the kingdom, their trade being new formed by it; for as the Union opened the door to the Scots into our American colonies, the Glasgow merchants presently embraced the opportunity, and though, at its first concerting, the rabble of this city made a formidable attempt to prevent it, yet afterwards they knew better, when they found the great increase of their trade by it; for they now send near 50 sail of ships every year to Virginia, New England, and other English colonies in America."

The period of the Union may be taken as marking the close of the history of Glasgow as a quiet Cathedral and University town of more local than national importance and the opening of its career as one of the great industrial and commercial centres of the world. At that time the population was not more than 13,000, the religious and political troubles of the later half of the seventeenth century having not only retarded its progress but largely decreased the number of its inhabitants. Thenceforward the population increased, at first slowly, but with ever-accelerating rapidity, till in the first half of the nineteenth century it grew with leaps and bounds. In 1740 it numbered 17,000, forty years later it was 43,000; the first official census of the United Kingdom in 1801 gave the population as 83,769. One hundred years later, in 1901, the population within the limits of the municipality was returned at 760,423, but, adding to that the inhabitants of Govan, Partick, and Kinning Park, which, although under distinct municipal control, are parts of the city, the total amounts to 904,948. Allowing for the growth of the city since 1901, and taking into account suburban population not under municipal authority, the inhabitants of Glasgow at this day certainly exceed one million.

The causes which led to the accumulation of a population of one million within two centuries did not come into full operation till after the Union. Scotland, as an independent kingdom, was excluded from trading with the colonies and dependencies of England and other foreign nations; but the Union placed Glasgow in the same position as all trading towns across the border. To enable the city to embark on a great commercial career, it was necessary to make the city a seaport, and already in the seventeenth century something had been attempted in that direction. Between the city and the waters which would carry a sea-going vessel there were about fifteen miles of a comparatively small stream, full of shoals and shifting sand-banks, navigable only by boats capable of carrying a few tons. Quite inadequate attempts at deepening the channel had been made in the sixteenth century, and in 1668, under a Charter from Charles II., a port and harbour for Glasgow were established at Port-Glasgow. That undertaking was a failure and disappointment from the very first, and Port-Glasgow was the port of Glasgow in name only. A small quay was provided at the Broomielaw in 1688, but the deepening of the river was not seriously taken in hand till in 1759 an Act of Parliament was obtained to "cleanse, scour, straighten, enlarge, and improve" the channel from Dumbuck Ford to the Bridge of Glasgow. From that time the deepening and improving process has continued, and the extension of harbour accommodation has gone on without intermission, at a total capital cost to the Clyde Navigation Trustees which now approaches £8,000,000. Throughout its entire length there is now a navigable channel of a minimum depth at low water of 22 feet 6 inches, and at high water of 11 feet more. The annual revenue of the Trust, which in 1800 was £3,300, reached in 1900 the sum of £441,000, and now it exceeds half-a-million.

The deepening of the navigable channel of the Clyde was clearly the key to the commercial and industrial position of the city. In proportion as the river was deepened the traffic increased, and with growing facilities for navigation shipbuilding developed. On the Clyde the launch of the little "Comet" in 1812, the first European steam boat, marked a new epoch. It was quickly followed by many other small river steamers, and the hold obtained on the Clyde over the nascent industry has never been relaxed. Shipbuilding is not only the most important industry of Glasgow and the Clyde, but the Clyde shipbuilding industry, notwithstanding all rivalries, yet remains unquestionably the greatest in the world. The "record" of the shipbuilding industry of the Clyde was reached in 1902, when 312 vessels of 516,977 tons and 458,870 horsepower were floated out of the various building yards.

Second only in importance to the shipbuilding industry is the building of locomotive engines in Glasgow. The North British Locomotive Company, Ltd., established in 1903 by the amalgamation of three great locomotive engine works, is, without doubt, the greatest concern of the kind in the world. And, besides this vast concern, the Caledonian and North British Railway Companies have both extensive building and repairing works in the city. Of the other various undertakings in mechanical engineering, the most prominent are the sewing-machine trade (Singer's alone employ 7,000 hands), pipe founding, and bridge building.

Both the mechanical engineering of Glasgow and its shipbuilding owe much of their progress and success to the coal and ironstone field of Lanarkshire, which spreads under the streets of the city. The coal and iron deposits of Lanarkshire are the richest and most extensive in Scotland; for upwards of three hundred years coal mining has been carried on around Glasgow, and at this day the resources of the field are being exhausted more rapidly than is the case with the deposits of any other part of the kingdom. The output of coal from the Lanarkshire field now exceeds 17,000,000 tons yearly. It has been recently calculated that 841,000,000 tons have been extracted, and that there yet remains a stock of 1,060,000,000 tons of proved coal to work, with a reserve of 885,000,000 tons of thin and doubtful coal. At one time the blackband and clayband ironstones found associated with the coal were locally smelted to the extent of two and a-quarter millions of tons, and for half-a-century Glasgow was the leading centre of the iron industry of the world. Now the local exhaustion of ironstone and the changed methods of iron and steel making necessitate the importation of vast quantities of hematite ore from Spain, &c., and Glasgow has lost its foremost place in this fundamental industry.

The river, coal, and ironstone have certainly been the most potent factors in the expansion of Glasgow, but yet another influence remains to be taken into account. It is but too well known that the district is blest or afflicted with an abundant rainfall; that streams are numerous, and consequently that the water supply is abundant; and that it was in earlier days pure. Hence was afforded ample advantage for bleaching. Out of bleaching grew up the calico printing and Turkey-red dyeing industries, and in connection with these many chemical manufactures were fostered. The preparation of dyeing extracts and bleaching powder and the great alkali industry were all directly related to the bleaching, dyeing, and printing of cotton fabrics, the spinning and weaving of which were also, at an earlier period, among the leading occupations of the people. Nor can we overlook the introduction of a vast water supply from Loch Katrine and other Perthshire lakes, in the middle of last century, as an influence in directly nursing many chemical industries. The fact that a practically unlimited supply of what, for manufacturing purposes, is equal to distilled water offers enormous advantages for the prosecution of numerous industrial pursuits.

And, finally, as contributing to the wealth and prosperity of the city, we have to accord no lowly place to the genius, the industry, the patience and prudence of her inhabitants. What Glasgow—what the world—owes to the discoveries and inventions of James Watt, of Joseph Black, and of Lord Kelvin, it is impossible to estimate; and after these come a host of men who in a more limited manner contributed to the prosperity of Glasgow and to the benefit of mankind. Among the most prominent there occur at once the names of David Dale, herd boy, hawker, manufacturer, turkey-red dyer, banker, and evangelist (father-in-law also of Robert Owen); in chemical industries there were Charles M'Intosh, Charles Tennant, and Walter Crum; in the iron trade, Mushet, Beaumont Neilson, John Wilson, and the Baird family; in shipbuilding and engineering, Robert Napier, John Elder, and James Reid; and in navigation, Henry

Bell, David Napier, and George Burns. May worthy sons of such illustrious sires long dwell in our midst, to maintain the best traditions of Glasgow industry and commerce, and to carry them to yet higher and increasingly beneficent development!

THE ART GALLERIES AND MUSEUMS.

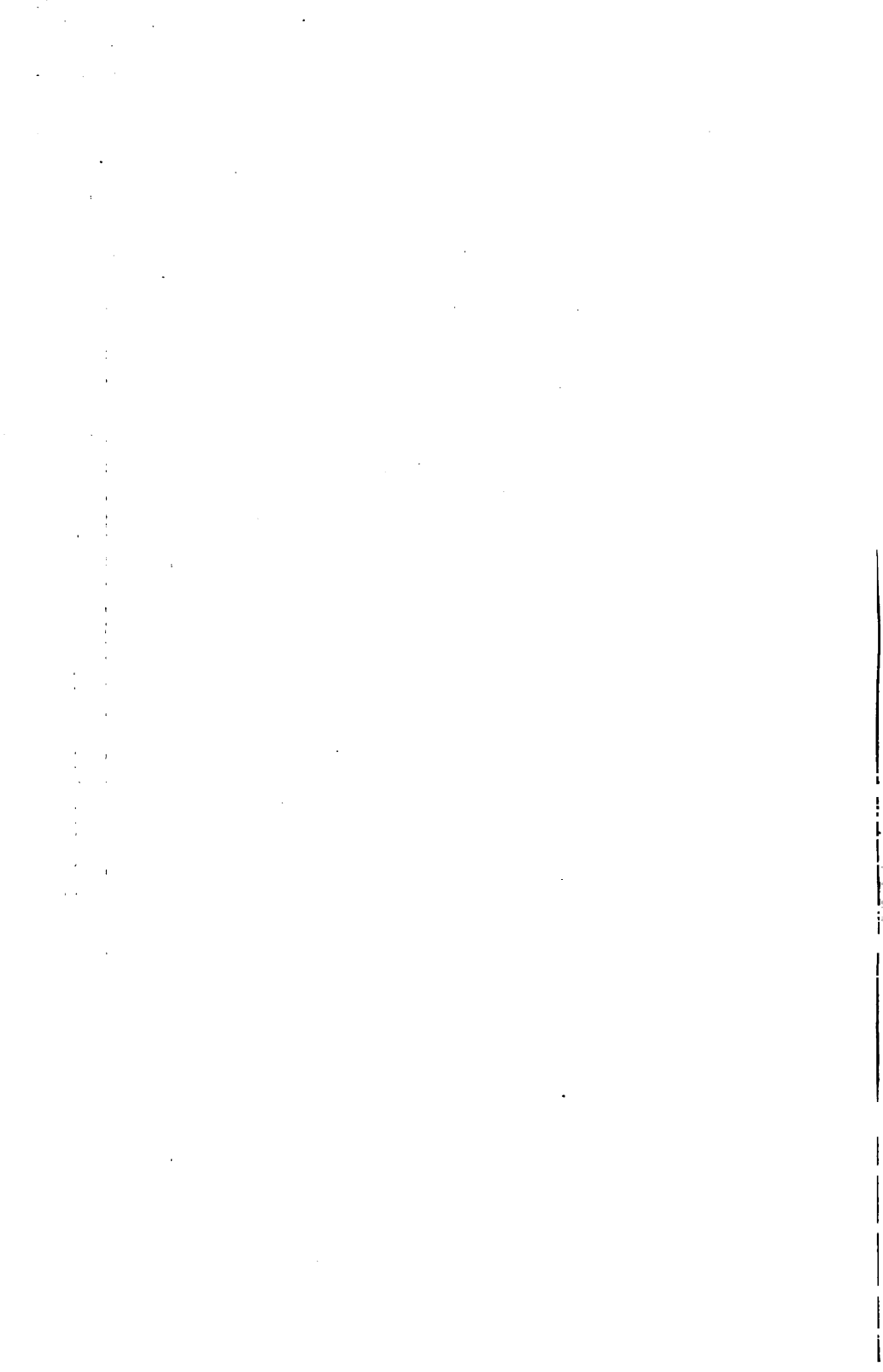
THE official connection with and patronage of art on the part of the Corporation of Glasgow dates back into the seventeenth century. In the year 1670 the Town Council resolved to procure from London portraits of Charles I. and Charles II. "for the townes use." The portrait of Charles II. was promptly obtained; that of his father was not received till 1677, when it was hung in "the Counsell-hous with the rest now thair." What "the rest" may have embraced we do not know, for there is no record of the acquisition of any portrait previous to that of Charles II. But among the series which ultimately adorned the walls of the Council House there is a portrait of James I. and VI., very primitive in execution, inscribed and dated 1618, which probably was one at least of "the rest." Afterwards, though not always during their reigns, portraits of successive monarchs were procured for the town's use and the adornment of the Council House. In the end that chamber was provided with a series of royal effigies extending from James VI. to George III., a portrait of whom was obtained in 1764. The only portrait of a personage beneath royal dignity admitted into that exalted gallery was that of the Duke of Argyll, which was ordered and obtained in 1750 from Allan Ramsay. When the long reign of George III. came to an end the old Council House of the Tolbooth had been swept away, and royal portraits were no longer desired for the decoration of its modern successors.

Nearly a century elapsed ere the Town Council again became actively interested in the patronage of art. In 1855, whilst the Crimean War was in its last throes, the Town Council of Glasgow was fiercely striving over the fate of a large collection of pictures which had been formed by Bailie Archibald M'Lellan, with a suite of saloons he had erected for the accommodation of the works. In the end, on 15th May, 1856, the Council resolved to acquire the pictures, &c., the exhibition galleries, and an extensive block of buildings erected in connection with them, for the sum of £44,500, being £29,500 for the erection and £15,000 for the works of art. Many pictures from the collection could be selected at the present day, each of which would realise the amount paid for the entire collection.

Such was the beginning of the art gallery and museum enterprise of the Corporation of Glasgow. Mr. M'Lellan's collection and the three galleries he specially erected for its display had really been dedicated by that enlightened citizen for the public use under a deed of bequest executed in 1853. On his premature death, however, in 1854, it was



GLASGOW ART GALLERY AND MUSEUM.



found that the state of his affairs would not permit of the carrying out of his patriotic purpose. That Mr. M'Lellan's bequest did not become operative may be looked on as a blessing in disguise, for his trust deed was burdened with conditions of an onerous and restrictive character, which would have limited its usefulness and prevented the further expansion of the Art Gallery on popular lines. The purchase of the collection by the Corporation for a nominal sum was effected unconditionally, and the authorities were left with a free hand to deal with their novel responsibilities in such a way as they might determine. The trust, unwillingly undertaken at the beginning, was in its early stages but grudgingly and inefficiently administered. The original name of "M'Lellan Galleries" was changed to "Corporation Galleries of Art," and under that title the institution continued in its original home for well-nigh half-a-century.

About eleven years after the purchase of the structure by the Corporation, the private tenants, who still occupied part of it, were expelled, with the exception of the shopkeepers on the ground floor; the upper floors underwent considerable reconstruction so as to render them suitable for public purposes, and afterwards were let to several educational and scientific institutions. The galleries in which the M'Lellan pictures were hung were at this time frequently let for public entertainments, concerts, bazaars, balls, and various social functions.

In spite of the apathetic interest and neglect with which the M'Lellan collection was treated for a long period after its acquisition by the Town Council, several valuable bequests and donations of pictures were made by public-spirited citizens anxious to see in the city a gallery of art which would at once be a credit to Glasgow and a source of pleasure and instruction to its citizens. Among these may be mentioned the donation and bequest by Mr. W. Euing, and the bequest of Mrs. Graham-Gilbert, of Yorkhill, which included a most valuable collection of old masters formed by her husband, Mr. John Graham-Gilbert, R.S.A., besides a large number of pictures executed by himself.

Soon after this munificent bequest by Mrs. Graham-Gilbert, received in 1877, the Corporation awakened to the fact that the pictures in their possession were of great value, and that they were administrators of a most important public trust and heritage. It was then resolved to seek the advice of some outside authorities upon the condition and proper utilisation of their collections. Accordingly, Sir Daniel MacNee, President of the Royal Scottish Academy; Sir William Fettes Douglas; and Mr. Robert Greenlees were asked to make an examination of the pictures and draw up a report regarding their artistic value. In the report which these gentlemen submitted, it was recommended that certain works should be withdrawn from the permanent lists, but they expressed their satisfaction with the greater proportion of the pictures, which they considered to be of great artistic value. A catalogue of the works was then prepared, approved of by these gentlemen, and, when completed, it was resolved to submit the collection to the scrutiny of Mr. (now Sir) J. C. Robinson, F.S.A., H.M. Surveyor of Pictures, who made a further examination of the pictures, and whose report did much to reinstate them as works of art that ought to be carefully treasured.

From this time onward a livelier interest was taken by the city in the art gallery and its contents. The public bodies which had hitherto met in the galleries removed elsewhere, and the Corporation obtained full control of their halls, enabling them thereby to do better justice to their art property and otherwise to further the interests of art in the city. In pursuance of this end, a number of exhibitions were organised, which met with considerable appreciation from the public. In connection with these exhibitions many valuable loans of pictures and art objects were received and placed on show in the galleries. The nature of the building made it particularly liable to risk from fire; in fact, fire had more than once broken out in contiguous shops whilst these loans were on exhibition. Eventually the committee resolved to cease such exhibitions owing to the great risk they involved. Out of these circumstances the desire to build a new art gallery and museum specially suited for such purposes arose, with results which will be seen in the sequel.

Turning from the history of the city's art collection, we pass to a description of how its first municipal museum was founded. In 1870 a small collection was begun in the old mansion-house of Kelvingrove, under the name of the City Industrial Museum. From the very first it was clear that the building was wholly unsuited for museum purposes, the principal and first-felt want being that it was far too small. The limited space available was subjected to very severe strain by the manner in which all sorts of objects began to be accumulated. As implied by the name which it bore, the original purpose of the museum was the formation of a collection illustrative of the industrial arts, but this idea of forming a purely technological museum was soon departed from, and collections were made of all sorts of objects—natural history, technological, ethnological, antiquarian, and others.

The smallness of the building soon became very obvious, and in 1874 an extension was resolved upon. With the sanction of the Corporation, an appeal was made to the public for subscriptions to defray the cost of the new building, whereby a sum of £7,500 was raised, to which the Corporation added £500, and the new building was proceeded with. That extension was opened in 1876 with an exhibition of local industries which had been arranged for in connection with the meeting of the British Association in Glasgow that year. During the existence of this museum the space available made it quite impossible for any systematic classification or arrangement of its contents to be carried out, and it came ultimately to be looked on more as a store than a museum suited for educational or scientific purposes. Yet it cannot be doubted that in some small measure it suited both these ends, and that there are many who miss it now that it is gone, and many who will remember it affectionately as the parent of its more pretentious successor.

From time to time since 1883 district exhibitions have been organised and carried out by the Museums and Galleries Committee, a large series of which were held in the halls connected with the Corporation's baths and wash-house in the Gorbals. In 1891 it was sought to organise a similar exhibition in the Bridgeton district, but a hall could not be found suitable for such a purpose. The failure to find a hall in this locality ultimately

resulted, after much investigation and deliberation, in the erection of the branch museum and winter garden, known as the People's Palace, on Glasgow Green, at a cost of £30,000. This building was opened on the 22nd January, 1898, by the Right Hon. the Earl of Rosebery, K.G. Besides containing several valuable collections of pictures, art, and industrial objects, as well as a type collection of natural history, the People's Palace has from time to time since its opening received valuable loans of pictures and other objects of art. A special feature in this institution is the yearly exhibition of some section of craftsmanship or art industry, at which prizes and certificates of merit are awarded to works entered for competition. Six of these exhibitions and competitions have already been held, and have proved highly successful, a large and increasing number of exhibitors and competitors coming forward from year to year. The exceeding popularity of this institution is shown by the fact that during the opening year it was visited by 770,807 persons, whilst the next two years show an average of 500,000. These figures then surely more than justify the erection of this building, showing that it has truly become a palace for the people, and that it has done, and may yet do, much to infuse some sense of the beauty and mystery of this great world into the lives of many who have but few opportunities of rising above their daily round of toil.

In 1894 the Corporation acquired for the extension of Queen's Park the grounds of Camphill, and with it the fine mansion-house which belonged to the property. From the first the Museum and Galleries Committee had their eye upon it as a most desirable position for a small district museum. After some structural alterations had been made to fit it for museum purposes, the Camphill Museum was inaugurated by a most successful photographic exhibition, and in this way another district museum was added to the list. At present it contains a collection of art objects lent by the Victoria and Albert Museum, a collection of modern paintings, and a type collection of natural history specially designed for the use of schools and elementary classes, besides a miscellaneous collection of art objects.

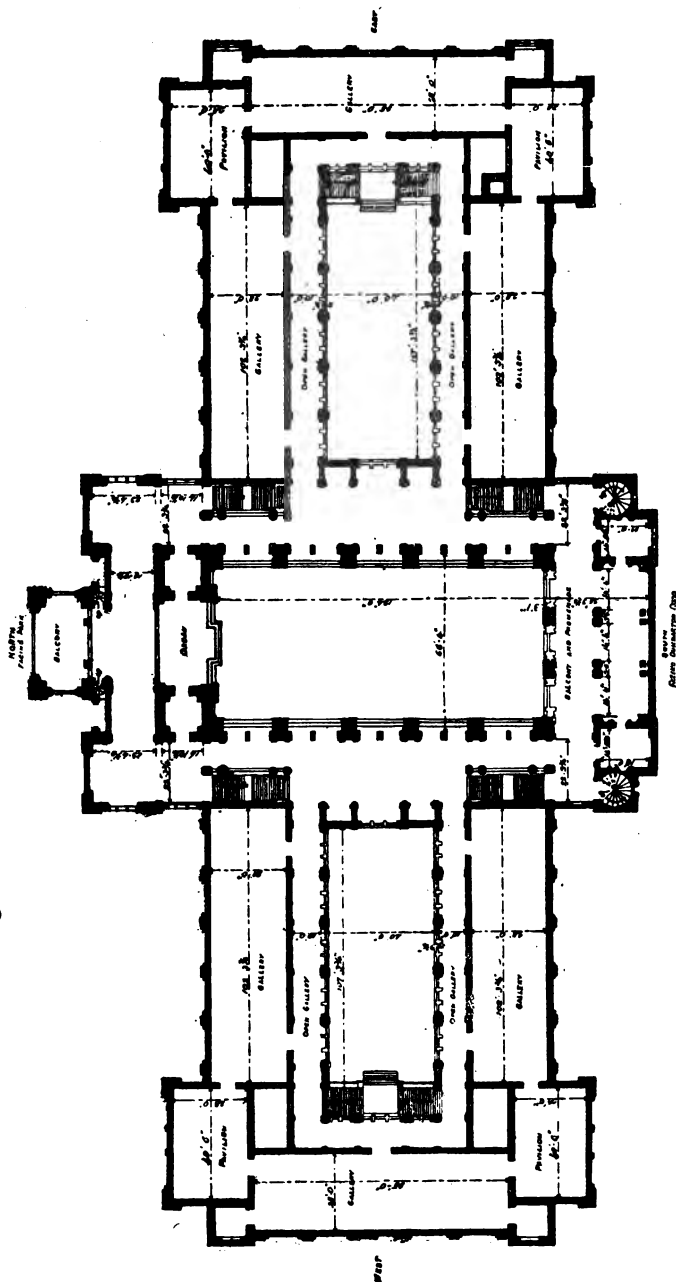
The next phase which falls to be chronicled in the development of the Municipal Art Galleries and Museums is by far the most important and ambitious of all the schemes that have as yet been taken in hand. As has been already stated, the great risks to which the art collections of the city were exposed from the insecure nature of the Corporation Galleries made it imperative that something should be done. Therefore, in 1886, the suggestion was thrown out that by the holding of a great temporary exhibition in Kelvingrove Park a sum of money might be realised that would, at least, form a nucleus for the raising of an adequate fund for the erection of a gallery of art and museum worthy of the city. Accordingly an International Exhibition was held in the summer of 1888, and proved such a complete success that upon its close the sum of £46,000 stood to the credit of the Exhibition Association. Not content with this large measure of success, the Exhibition Association undertook to double the amount by public subscription if the Corporation would grant a site in Kelvingrove Park for a new building for art gallery and museum purposes, and allow the administration of the fund, the adjusting

of the scheme of building, the selection of an architect, and the execution of the work to devolve on an executive committee, elected in the proportion of two-thirds from the Corporation and one-third from the Exhibition Association. This committee, under the new name of "The Association for the Promotion of Art and Music in the City of Glasgow," set vigorously about their work, and within the prescribed time—twelve months—they had gathered more than the minimum £46,000. A site was then claimed in Kelvingrove Park, and the first steps were taken towards the erection of the new building. After open competition, plans submitted by Messrs. J. W. Simpson & Milner Allen, of London, were, in June, 1892, selected, under the advice of Mr. Alfred Waterhouse, R.A. The estimate given by the architects for the completed building was £154,398, or, leaving the quadrangles uncovered, £119,775, whilst the local surveyors put these figures at £170,320 and £130,450 respectively. Even these larger figures, however, were in the end discovered to be far below the amount of the contracts sent in for the work. Having, however, £113,000 in hand the work was proceeded with, the committee being confident that the cost would not greatly exceed £120,000. After contracts for the basement had been received, with some surprise it was found that the estimate for this preliminary section alone reached £22,225, and eventually it cost £2,000 more. It was afterwards found that the superstructure could not possibly be raised for a less amount than £154,000, which so far exceeded the original amount collected by the committee that they found themselves in the somewhat awkward position of having spent £25,000 upon a building which, to partly finish in a second-rate manner, would cost £27,000 more than they were possessed of, while to completely finish it in a worthy manner would mean an outlay of £70,000 beyond the sum actually in hand.

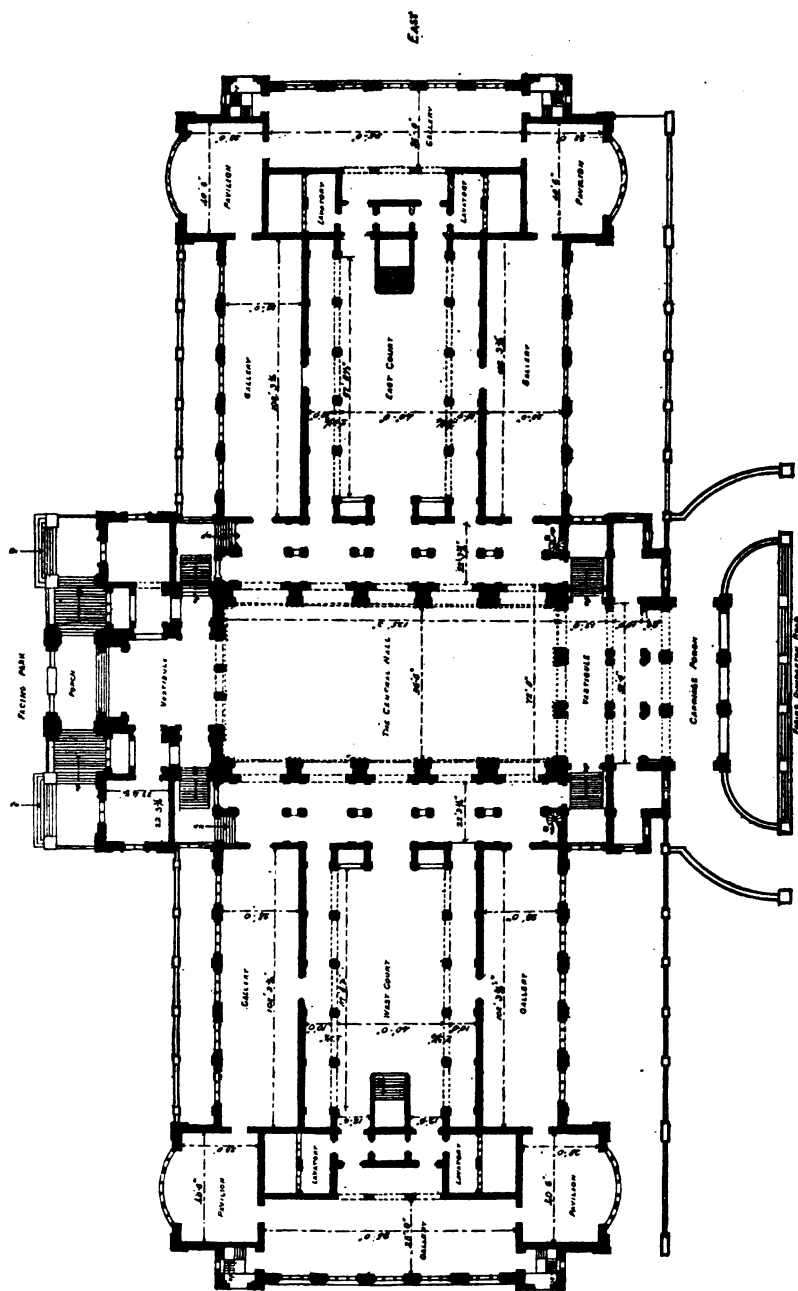
In this somewhat difficult position, the only resource left to the committee was to approach the Corporation, and ask them either to guarantee funds sufficient to carry the building to completion, or to take over the whole matter, and deal with it themselves. The latter alternative was accepted, and now the building has been completed in the most substantial fashion, under the supervision of the Museums and Galleries Committee, aided by certain consulting members selected from the defunct Association for the Promotion of Art and Music.

The building as finished is a highly original and ornate structure, conceived in the spirit of the French Renaissance architecture. It has a total length of 448 feet, and is 256 feet wide, with frontages, porches, and entrances of equal importance on both north and south façades. In outline it is very varied, having at each corner cupola-mounted pavilions, which rise to a height of 104 feet. The roof of the central hall rises high above the general level, and over its north porch, as well as flanking both sides, are towers, the loftiest of which reach a height of 172 feet. Surmounting and terminating the north porch tower is a bronze figure of Victory, while the flanking towers are finished with figures emblematical of Immortality and Fame. The main and most important sculpture group, the work of Mr. George Frampton, R.A., is planted within an open arch in the centre of the north porch, and appropriately represents St.

Glasgow Art Galleries.



First Floor Plan



Ground Floor Plan



Mungo—the patron saint of Glasgow—a powerful figure of a mediæval ecclesiastic—protecting art and music, typified by female figures to the right and left of the saint. Sculpture and ornamental carving are, indeed, prominent characteristics of the building, both without and within. On the piers between the windows are festooned panels, bearing the names of the greatest artists—painters, sculptors, and architects—of all times. In the arched panels above the windows are elaborate coats of arms for all the Scottish counties, and within the building there are panels, &c., for the various incorporated trades of Glasgow, and for the names of men of all countries eminent in music, history, science, and industry.

The interior is laid out in an eminently simple manner, and on lines of the strictest bilateral symmetry. The great hall, with spacious north and south vestibules, forms the central feature of the building. The hall is a very striking structure, 125 feet in length by 56 feet in width, rising to a height of 80 feet. It is richly finished in a fine cream-coloured sandstone, which, with its abundant carved surfaces, its numerous pillared archways and elegant balconies, its lofty clerestory windows, and its floor of variegated white, black, and yellow marbles, at the first glance captivates the observer. Within a spacious arched chamber on the upper floor level, in the north side of the hall, a great organ has been erected, the notes of which may be heard, not only in the central hall, but throughout the entire building.

Two spacious courts, roof-lighted, to right and left of the central hall, are reached by arcaded passages. These courts measure 102 feet in length by 60 feet in width, and are finished in sandstone, with arcades and marble floors, the same as the great hall. Around these on three sides are galleries, lighted by side windows, 102 feet in length by 28 feet in width, and each corner of the building is formed into a pavilion about 40 feet square, with a subsidiary entrance at its external angle.

The upper floor is reached by six staircases, two to the right and left of the north and south vestibules, and one at the extremity of each court. The galleries correspond in size and disposition with the saloons under them on the ground floor. There are thus six long galleries, four pavilions, and, occupying the space over the subsidiary entrances in the extreme angles, four small apartments. The galleries and pavilions are roof-lighted. Besides communicating with each other internally, they are also reached by a wide arcaded corridor, which passes round the three sides of the courts. These corridors run into a broad balcony, which extends around the central hall. To the north, passing behind the organ loft, it widens over the north vestibule and porch, and similarly on the south side it extends over the south vestibule and entrance. A third floor hall, over the south vestibule, is reached by two lateral circular staircases.

The basement affords ample storage accommodation, with workshops and a range of offices. In it also are the heating and ventilating appliances, while an electric elevator communicates with the ground floor and upper galleries. In a second well a mechanical hoist has been installed for dealing with weights too great for the elevator.

The heating and ventilating of the building is effected on what is termed the plenum system, by plant supplied by the Sturtevant Engineer-

ing Company. Under this system the cold air from an inlet shaft is drawn in by an electrically driven enclosed fan. The air is washed by passing through a corrugated filter, fitted with water flushing and spraying arrangement. It is then, for heating, passed through steam-heated coils, and delivered into the main basement flues, whence by means of ducts built in the walls it is delivered into the various halls, corridors, and apartments of the building. It is unnecessary here to describe the boilers, steam economisers, electric motors, and fans concerned in the purifying, heating, and distribution of the air supply. It is sufficient to say that duplicate heating and ventilating fan apparatus are supplied, one set serving the east and another the west portions of the building. Each fan is driven by a 30-horse-power motor, working at 500 volts, and making up to 670 revolutions per minute. The fan running from this power at 120 revolutions per minute delivers upwards of 5,000,000 cubic feet of washed and heated air per hour. There is no difficulty in maintaining a regulated temperature in the cold season, and in summer the drawing in and washing of the air suffices to cool it at least about 4 degrees under the external temperature.

When the work of erection had reached a stage at which the date of the completion of the structure could be approximately estimated, it was resolved, on the initiative of the Museums and Galleries Committee, that again an International Exhibition should be organised. The object of the Exhibition was twofold—firstly, for the due inauguration of the new art gallery and museum building, which it was stipulated should form an integral part of the Exhibition; and, secondly, it was hoped that, from an undertaking successful as that of 1888, a surplus might accrue which would further aid in the enrichment of the art and science collections of Glasgow. The resolution to hold, in 1901, an International Exhibition was enthusiastically supported by the citizens, and the necessary steps for carrying out the undertaking were quickly and efficiently completed. In the Exhibition scheme the permanent buildings were devoted to the housing of a loan collection of British and foreign art of the nineteenth century, a general collection of art objects, and a series illustrating the archæology and history of Scotland. On the 2nd of May, 1901, the building containing these collections was formally inaugurated by H.R.H. the Duchess of Fife and His Grace the Duke of Fife, as part of the opening ceremonial of the Glasgow International Exhibition of 1901.

The exigencies of the Exhibition demanded the demolition of Kelvingrove House in which the nucleus of the museum was formed. That building, not devoid of romantic and poetical associations, and moreover a charming example of the eighteenth century architecture in the Adam style, was taken down in 1899, and to that extent Kelvingrove Museum was dismembered. As a separate institution it entirely ceased to exist at the close of the year 1900, when the wing which had been built by public subscription was denuded of its contents, and handed over to the Exhibition authorities for their purposes.

With the close of the International Exhibition of 1901, and the distribution of the loan collections of art and historical objects, to which the new building had been devoted, the Kelvingrove Art Gallery and Museum came again under the undivided control of the Corporation.

Practically the work of dispersing the loan collections was completed with the first days of 1902, and thereafter steps were immediately taken for the installation of the permanent art gallery and museum collections. It became necessary to determine, in the first place, the allocation of space to the various art, science, and industrial collections which fell to be accommodated within the building. After mature deliberation, the sub-committee approved of a scheme of distribution, the main features of which are as follows:—

The collections which had to be dealt with were classified under the following general heads:—

- I. Fine Arts.
- II. Industrial Arts.
- III. Natural History.

These, taken together, form the basis of an institution so comprehensive as to embrace illustrations of every phase of art, science, and industry which can be represented in a museum.

The plan and construction of the building itself suggested the general allocation of space to the three great divisions.

The upper floor fell to be occupied with the Fine Art Department, excepting the division of sculpture, to which the great central hall was devoted. The east wing of the ground floor was given over to Natural History, and the corresponding west wing remained for the Engineering, Technological, and Archæological Departments. When the requirements of these several divisions are considered, it becomes obvious that for collections so varied and comprehensive the available space within the structure is exceedingly limited. In consequence it became necessary to select specimens for exhibition with very great care, and with a rigid regard to their high value as works of art, to their significance in the applied arts, and to their teaching value in natural history. The work of installation and arrangement was so far advanced that it was possible to throw the institution open to the public in the autumn, and on the 25th of October, 1902, the Art Gallery and Museum of Glasgow (Kelvingrove) was formally declared open by the Lord Provost.

Within recent years the collections have been richly added to by notable gifts and bequests. In 1896 the sons of the late James Reid, of Hydepark Locomotive Works, presented to the city, as a memorial of their father, ten of the most valuable pictures from his collection. The sum paid for these pictures by Mr. Reid was £22,723. In 1898 the city received under the will of the late Mr. Adam Teacher his entire gallery of modern works, comprising one hundred and seventeen pictures, besides other works of art. From Mr. Thomas Graham Young there was received, in 1900, a collection of fifteen pictures, seven engravings, and an Italian marble bust, besides numerous and valuable art objects and museum specimens. These were given as a memorial of his father, James Young, LL.D., F.R.S., of Kelly, and later the importance of the memorial was much enhanced by a gift from Mr. Graham Young's sister, Mrs. Walker, of Limefield, of the magnificent tondo by Botticelli, which now adorns the Gallery. Subsequently there were received twenty-one oil paintings and thirty-two

modern water-colours, besides a cabinet of engravings, a bequest by Mr. Thomas D. Smellie; and, under the will of Mrs. Janet Rodger, seven Highland landscapes by Horatio M'Culloch. The twenty-three pictures assigned to the Corporation by Mr. A. G. Macdonald, subject to the liferent of his wife, have also been added to the collection; and gifts of individual pictures have been both numerous and of high value. Throughout the past thirty years there have steadily accumulated, principally through gifts, vast collections of technological, ethnological, and archæological specimens, and a great natural history museum has been built up.

The popularity of the Glasgow Art Gallery and Museum may be estimated from the fact that in the first complete year (1903) of its existence it was visited by no fewer than 1,113,688 persons. In the same year there were 384,125 visitors to the Green Branch (People's Palace), and 71,502 to Camphill Branch. In all 1,570,134 persons visited the Glasgow Museums and Art Galleries during 1903, a number, it may be safely affirmed, far in excess of the record of annual visitors to the permanent exhibitional institutions of any other municipality in the world.

PARKS.

THE student of municipal history a century hence will find the Public Parks of the City landmarks of a permanent character, indicative of a notable phase in the energy which has characterised the civic management of affairs in the rapid development of Glasgow during the latter half of the nineteenth century.

Fifty years ago the only public park was the Green, which for two hundred years has played no mean part in the history of the city as a rendezvous and place of resort for its inhabitants. Although the rapid growth of the city caused the more thoughtful to view with dismay and alarm the disappearance of open space and green field under the invading march of the builder, in whose operations there is no sentiment or regard for natural beauty, it was not until 1852 that the civic conscience was awakened, and the necessity of preserving some of the natural beauties which surrounded the city made apparent. The pity is the awakening did not take place sooner. The purchase of the lands of Kelvingrove for the purpose of forming a public park marks an era in the history of the city, the outcome of which has been the creation of a municipal Parks Department, whose work plays no unimportant part in the health, welfare, and pleasures of the community.

The progress that has been made in securing and equipping parks and open spaces during the past fifty years will be best shown by giving a brief description of each place in their order of acquisition, with a few notes on their most salient features.

I. GLASGOW GREEN (136 Acres).

This park, which has a comparatively flat surface, stretches eastward from the historic Saltmarket, and has a frontage of over $1\frac{1}{4}$ miles on the north bank of the Clyde. The soil is chiefly an alluvial sandy loam, resting on a muddy clay. In 1450 James II. made a grant of land to Bishop Turnbull, and it is supposed this worthy bishop in turn gifted a portion to the community, part of which formed the nucleus of the parks system of the city. The alienation of the burghal lands is a matter of history, and the original "Green" is now covered with streets and buildings. The site of the present "Green" was re-acquired between 1662 and 1792. For many years it was used for general communal purposes, notably for drying the nets of the salmon fishers, bleaching of trade and private linen, grazing of cows belonging to burgesses, and the playing of golf! In the early decades of the past century, with the increasing population and quickening of the movement of civic life, there arose a demand for improvement on the Green to meet the changing conditions, and the old order of things passed away. The change, however, was not revolutionary, but rather that of a gradual process of development, which is yet in operation to meet present-day requirements. Along with these developments other changes take place which are anything but improvements. For example, the change of environment by the multitudinous buildings, with their poisonous emanations of black smoke and deleterious fumes, has had the effect of destroying the arboreal vegetation which once adorned the Green, and which now makes the cultivation of the most hardy species of plants a matter of difficulty. While changes are inevitable, the excessive pollution of the atmosphere by smoke is inexcusable, and the evil effects are yearly becoming more pronounced on the vegetation in every park in the city.

Among the material changes which have affected the appearance and altered the character of the city's oldest park was the covering over of the Molendinar and Camlachie Burns, both of which had become unsavoury sewers. The erection of the Nelson Monument in 1805, which for many generations has been a conspicuous landmark and rendezvous for political and other gatherings. The sweeping away of the old wash-houses and the formation of good carriage roads and footpaths in the second quarter of the century. The erection in 1860 of the first open-air gymnasium in the city by a native, Mr. D. S. Fleming. The monument to the poet Macdonald—which is in the form of a drinking fountain—was erected in 1881. In the same decade the Doulton Fountain—which was an exhibit in the Glasgow International Exhibition of 1888—was presented by Sir Henry Doulton. This fountain, which is unique in design and conception, is well worthy of inspection and careful study. During the last decade the filling up of the Fleshers' Haugh with the excavations from the Caledonian Central Underground Railway, and the erection of the People's Palace and Winter Garden, which was opened by Lord Rosebery on the 22nd January, 1898, stand out as notable changes; while in the opening years of the present century the formation of a roadway and bridge between James Street, Bridgeton, and Govan Street, on the south side of the river, with the view of giving

some relief to the increasing congestion of the streets west of the Cross and providing a more direct connection between the eastern and southern districts of the city, may be but part of the silent evolutionary movement caused by the changing conditions of the times and requirements of the citizens.

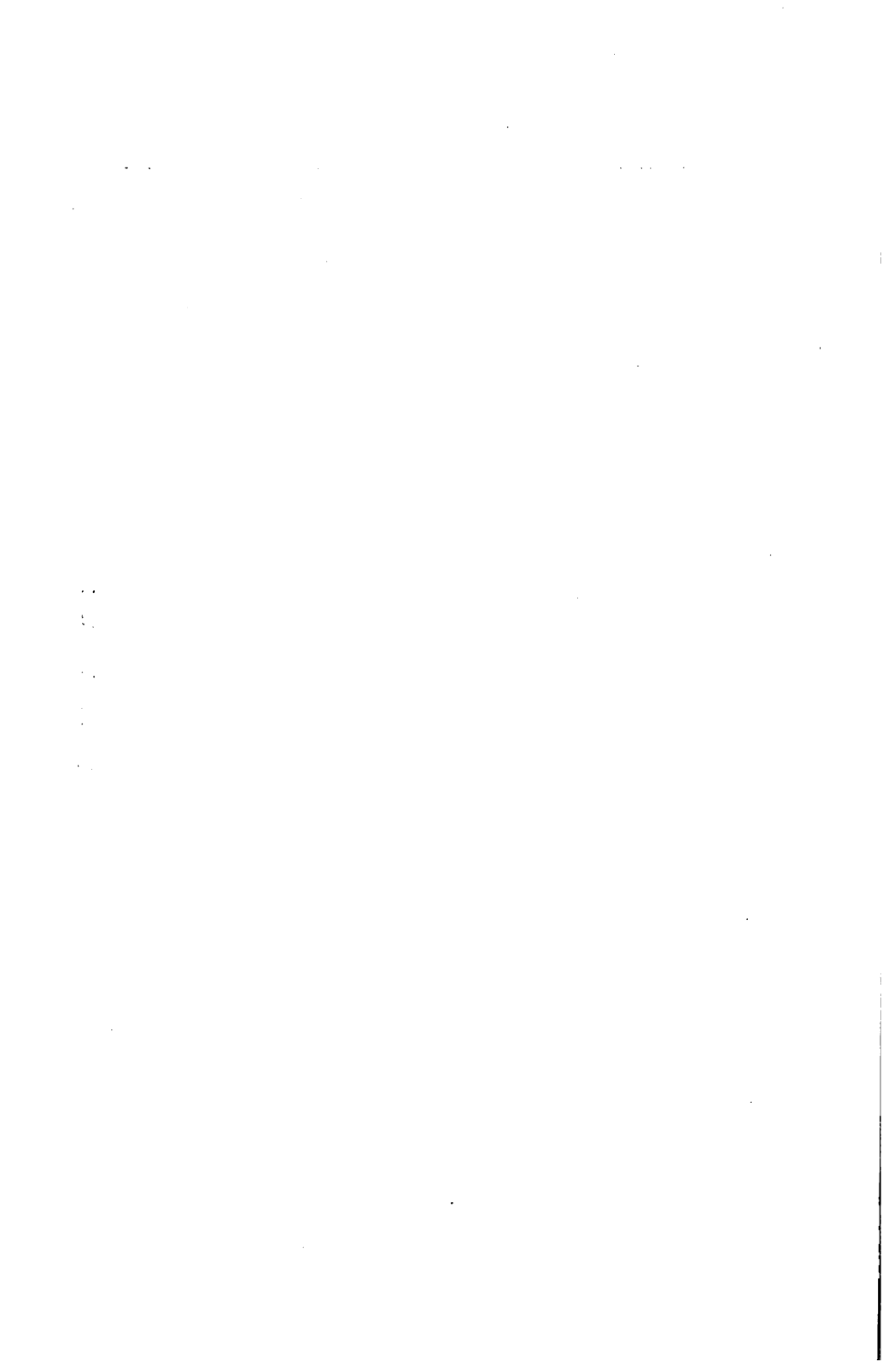
2. KELVINGROVE PARK (85 Acres).

Next in order and historical association to the Green, this is in many eyes the most picturesque, as it certainly is one of the most popular, parks in the city bounds. As part of the Kelvingrove immortalised in song, the grounds possessed much natural sylvan beauty, and, though much of that charm has disappeared by the change of environment since their acquisition in 1852, the promoters of the purchase deserve the thanks and appreciation of generations of citizens for their wisdom and forethought in securing these lands for the city in spite of strong opposition at the time. Owing to the peculiar configuration of the grounds and absence of large flat surfaces, the park does not lend itself to recreative purposes in the form of games, such as football, which requires great space. Still, it is an admirable "lung" of the city, and children have ample room to disport themselves in various parts. The situation lends itself more readily to the "gardenesque park" than to the popular playground, and, though many object to the gardening, were that feature eliminated there would be a distinct loss in the amenities of the city and an educative influence of no small value. Visitors should make a point of viewing the park from the high carriageway near the flagstaff, where the most salient features are best observed. The Fine Art Gallery and Museum is conspicuous to the left of the valley of the Kelvin, with the University on high ground on the opposite side; and between, at extreme end of the park, is another noble institution—the Western Infirmary. In the near foreground is a finely modelled group by Cain of a lioness feeding her young, and beyond is the Stewart Fountain, erected to commemorate the services of Lord Provost Stewart, to whose energies the city owes its magnificent water supply. A little further away is the old Museum—temporarily housing the Jeffrey Reference Library—which, though not a thing of beauty in itself, is a milestone on the road of the march of municipal progress in one direction. These, with the setting of green grass, trees, and shrubs, with the river winding between, present a picture not often met with in the midst of a busy manufacturing and commercial city. The view from the Art Galleries or from the pathway below the University, looking eastward, is also interesting.

In this park two very successful International Exhibitions have been held—the first in 1888 and the second in 1901. Consequent on these and the building of the Art Galleries, the south-western part of the grounds has been in a transition stage for a series of years. In the work of restoration advantage is being taken to form two public bowling greens immediately east of the Art Galleries, the success of the experimental greens on Glasgow Green having warranted the Corporation in extending the facilities for the enjoyable recreation of bowling.



QUEEN'S PARK.



3. QUEEN'S PARK (146 Acres).

The acquisition of Kelvingrove for the western district proving such a boon, attention was next directed towards providing a park on the south side of the river, which was also rapidly expanding in that direction. Many worthy citizens thought matters were being pushed too fast, and feeling ran high when it was proposed to purchase the farm of Pathhead for park purposes, one of the principal objections being that it was too far outwith the city to be serviceable to the inhabitants. So evenly divided were the Council on the question that only by the casting vote of the Lord Provost was the proposal carried, and in 1857 these lands, which now form the east portion of Queen's Park, were acquired. Probably few purchases for park purposes have been better justified than this. Dealing with purely agricultural land, without any special feature in the way of arboreal vegetation to preserve, there was no restriction as to the lines on which it had to be laid out. Hence the planning has been effectively made on broad lines, and, had the full scheme proposed by the architect and desired by the Corporation not been thwarted by certain private proprietors, the effects, good as they are, would have been much better, and the city is poorer to-day in streetscape. Of the 143 acres then acquired, sufficient ground was set aside for building purposes, which having been readily taken up, the original cost of the park has been recouped. This method of dealing with land purchased for park purposes, while commendable in some aspects, requires to be modified according to the exigencies of the situation.

For over thirty years after the park was laid out it was outwith the city boundary, and the small burghs which sprang up in its vicinity enjoyed its benefits without contributing a penny towards its maintenance. After the City Extension Act of 1891, when these small burghs were absorbed, there was a further and most important addition to the park by the purchase, in 1894, of the lands of Camphill, which formed the western half of the small hill whereon the park is situated. The 56 acres embraced in the purchase was the natural completion of a park worthy of the city, and, being well furnished with fine trees, the addition retained one of the fast-disappearing natural places of beauty which characterised Glasgow in bygone days. The enlarged park is none too big for the needs of the huge population who live around its borders, while its situation is one of the finest in the city, and commands views of no mean order. When the atmospheric conditions are favourable, the view from the flagstaff mound demonstrates clearly the cosmopolitan nature of Glasgow's industries, as well as the beautiful country which the spread of the city is gradually destroying.

Owing to its geographical position the park escapes the bulk of the city's smoke. Accordingly the vegetation is cleaner and more luxuriant than most of the parks within the municipal area. Visitors interested in plants will find many interesting trees and shrubs within the grounds, and the old gardens of Camphill are unique in their way, having an old-world air now rarely met with in the neighbourhood of modern cities. In 1896, to meet the wants of the newer parks, a large range of pro-

pagating houses were erected as a central plant-propagating establishment. Part of these houses were opened for public inspection, and were so much appreciated that an addition had to be made a few years later to accommodate, not only the growing collection of plants, but the enormous number of visitors who frequent them. To meet the evident appreciation of plants, many groups of plants are cultivated which were never contemplated at first, and the aim now is to keep up a display of bloom throughout the year. To this end several thousand chrysanthemums are cultivated, while pelargoniums, fuchsias, begonias, azaleas, rhododendrons, callas, carnations, and other subjects are grown in hundreds; likewise a collection of orchids—a class which has taken the public fancy to a marked degree.

Apart from the merely pleasing and ornamental part, ample provision is made for recreation in the form of such active games as cricket and football, and during the course of the present year two public bowling greens will be laid out.

4. ALEXANDRA PARK (104 Acres).

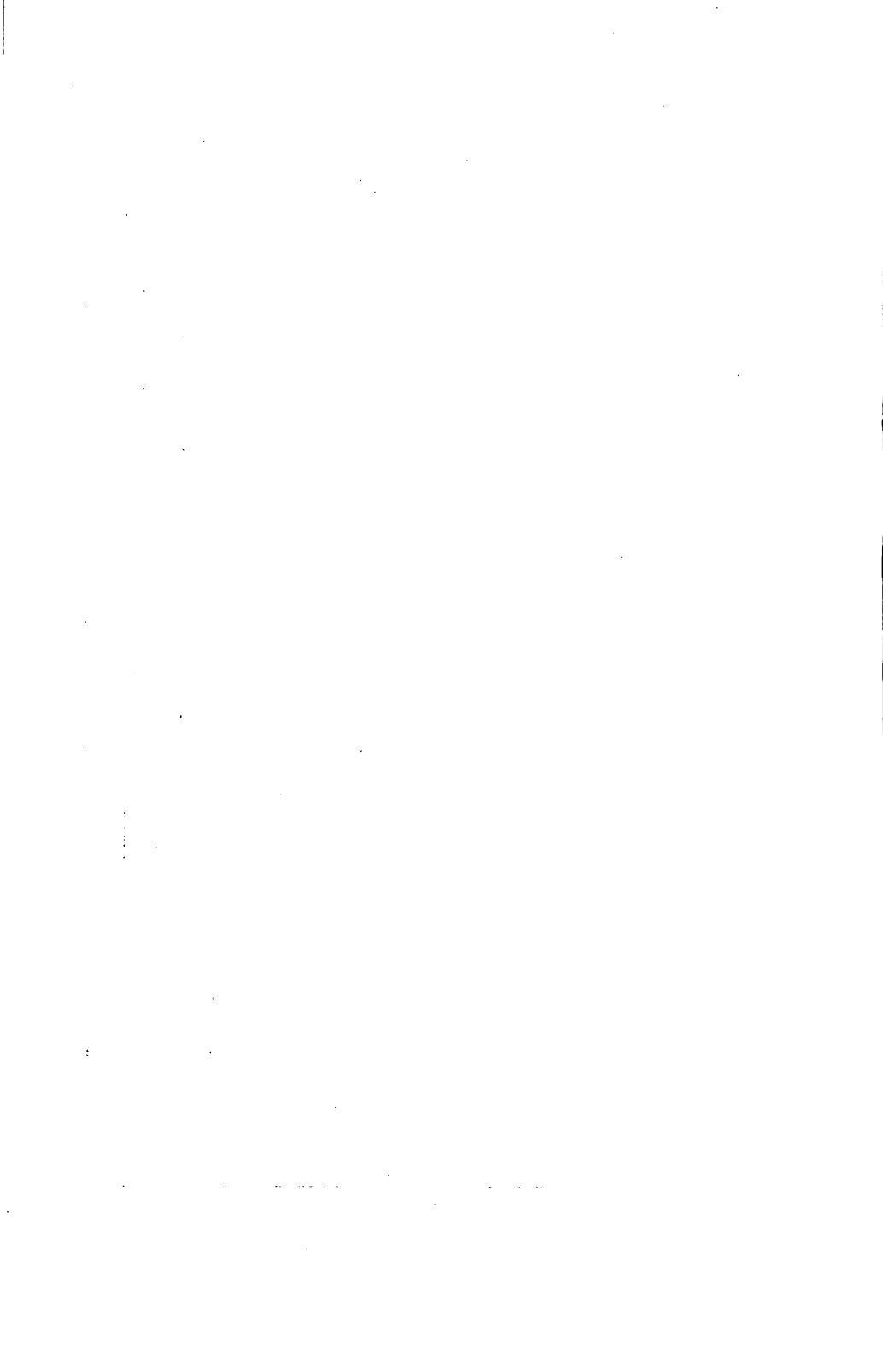
The next district to receive attention was the north-eastern, but it was not until the City Improvements Trust began operations that an opportunity was got to acquire a suitable area. In 1866 this Trust purchased 79 acres of the estate of Haghill and laid out this park, afterwards handing it over to the Parks Trust. To facilitate the work, Mr. Dennistoun, a neighbouring proprietor, who recognised the fact that the proximity of a public park would materially assist the development of his estate for building purposes, gifted five acres of land to the Corporation to provide a better entrance to the park. This gift is notable as being the first of its kind towards park purposes in Glasgow.

While conveniently situated for the Townhead and rapidly extending district of Dennistoun, great difficulty attends the clothing of the bare wind-swept site with arboreal vegetation. The stiff clay soil might be made amenable by tilling, but the noxious emanations from the chemical and other manufacturing works in the vicinity are destructive to all but the very hardiest species of trees and shrubs; even these are none too happy in their surroundings. Though not so favourably situated from the landscape point of view, this park proves a splendid outlet for the exuberant energy of the younger generation of the community in the playing of golf and football, also in the milder amusement of model yacht sailing on the pond provided for that purpose. It may here be mentioned that the playing of golf is to be discontinued on this park, on account of the great increase of the population in the neighbourhood who regularly frequent the grounds, and that game is to be transferred to the lands of Blackhill, which have been leased by the Parks Department from another department of the Corporation for golfing purposes.

The park was enlarged in 1891 by the purchase of part of the lands of Easter Kennyhill, and of late years works have been in operation towards the improvement of its amenities, while others are contemplated in its general equipment to further enhance its usefulness.



BOTANIC GARDENS.





TOLLGROSS PARK.

5. CATHKIN BRAES PARK (49 Acres).

In 1880 that well-known and worthy citizen, the late Mr. James Dick, presented this park, "to be held in perpetuity as a place of resort for the community and inhabitants of the City of Glasgow, and that as far as possible the natural features and configuration of the ground should be maintained and preserved." These conditions have been observed to the letter, but, as the park is yearly becoming better known and more appreciated by the citizens, some works are contemplated to meet the requirements of the vast numbers who frequent the park on public holidays. These works will, however, not injure the natural features which the generous donor desired should be preserved.

Though six miles from the Royal Exchange, this park commands a view of the Clyde valley which is unsurpassed by any in the near vicinity of the city, and as travelling facilities are now easy and more convenient, citizens who have not visited Cathkin Braes should make a point of doing so.

With the exception of the gift of the Cathkin Braes Park, above alluded to, there was no addition made to the parks area for twenty-five years. Therefore the City Extension Act of 1891, which incorporated so many outlying burghs within the municipal area, marks another distinct era in the history of the parks. So evident had the necessity of parks and recreation grounds become to town dwellers that each of the acquired districts, not already provided, made the acquisition of such a distinct condition in their acquiescence to annexation.

6. BOTANIC GARDENS (43½ Acres).

It is unnecessary here to enter into details of the history of Glasgow Royal Botanic Institution, beyond noting that its inception and early career were marked by conspicuous enthusiasm, zeal, and success, while the latter part of its existence as a private concern was beset and hampered with difficulties so great that the wonder is the burden was borne so long. Every credit is, therefore, due to those who assisted by their time and purse to prevent this useful institution from being extinguished—a calamity which would have made the city poorer than most people imagine.

The Corporation, having taken up the burden, and entering into possession in 1887, saved the situation. Legal difficulties prevented the gardens being opened free to the public until after the passing of the City Extension Act in 1891. Once opened, they became exceedingly popular as a pleasure resort, which popularity appears to increase yearly, judging by the number of visitors. The city may well be proud of such an institution, whose educative value cannot easily be appraised. When acquired, the area was 21½ acres. The purchase between 1892-6 of the wooded slopes on the north bank of the Kelvin, from Queen Margaret Bridge to Maryhill Railway Bridge, and in 1900 of the south bank next Kirklee, makes the area now 43½ acres. These latter purchases, while not readily available for pure "garden" purposes, provide additional open space, and save the amenities of that part of the city from despoliation.

Although the naturally cold soil and increasing volume of city smoke make it impossible to cultivate many tribes and species of plants throughout the grounds, many subjects of interest to plant lovers will be found, as well as a fair representation of popular objects. The equipment of the garden in the matter of collections of exotic plants cultivated in the glass houses is perhaps the most notable feature. In a city where cloud and rain predominate over sunshine and blue sky, the appreciation of conservatories is greater than in places where the climatic conditions are reversed. Hence the winter gardens are of immense value to the community, and in the Kibble Palace the citizens possess one of the most unique erections of its kind known, and visitors will find therein many notable plants, particularly the fine group of tree ferns under the central dome.

7. MAXWELL PARK (21 Acres).

Presented by Sir John Stirling-Maxwell, of Pollok, Bart., to the Burgh of Pollokshields, this park came under the city's jurisdiction after the Annexation Act in 1891. For its size it is well equipped, having a model yacht pond, band-stand, playgrounds, &c., and admirably suits the residential district in which it is situated. On account of its surroundings and the freshness of its vegetation, it is frequently called the "garden" park of the city—an epithet well applied in the summer months.

8. SPRINGBURN PARK (67 Acres).

Situated in the extreme north-east district of the city, with an elevation of 300 feet above sea-level, the position, though somewhat windswept, commands extensive views, and forms an excellent health resort for the toilers of that busy and important industrial district. When the ground was acquired in 1892 to form a park it was bare, indifferent agricultural land, with the remains of an ironstone pit at one corner and an old quarry at another. No time was lost in beginning laying off the grounds on a simple plan—work no doubt accelerated by the gift of a most handsome bandstand by Mr. James Reid, of the Hydepark Locomotive Works, which necessitated suitable approaches and surroundings. The erection of necessary offices and waiting-rooms, formation of a model yacht pond, planting of trees and shrubs were pushed on simultaneously, so that within three years of its acquisition the equipment of the park was fairly complete. While sufficient area was made ready for present requirements, a considerable portion was left over as a stand-by for any labour emergency. The next step towards extra equipment was the lordly gift of £10,000 from the Messrs. Reid towards the erection and furnishing of a winter garden, which was erected and opened in 1900, and now forms a popular resort, delighting thousands by the floral displays therein throughout the year. An addition was made to the park by the purchase of an adjoining property in 1900, and another addition has been made this year by the acquisition of the house and



RUCHILL PARK.

grounds of Mosesfield, through the generosity of Mr. Hugh Reid, who purchased the property and presented it to the city.

The appreciation of the munificent gifts to the city by the Reid family led the people of Springburn and district—with which the Messrs. Reid are most closely identified—to erect a monument in the park to the memory of the late Mr. James Reid, who was so long identified with many notable undertakings in the city, and to whose ability and energy Springburn owes much. This monument, which is in the form of a life-size statue of Mr. Reid, occupies a prominent position in the park, adds another object of interest in its amenities.

Allusion has been made to a portion of the ground being left untouched in the event of a labour emergency, that emergency having arisen when, owing to the depression of trade last autumn, many men were thrown idle. To provide work for the most necessitous, a beginning was made to improve the north and east sides of the park. A large portion was trenched preparatory to planting trees and shrubs, an ornamental pond for water-fowl has been formed, and two bowling greens are presently in course of formation; these works, when completed, while providing further means of recreation and pleasure for the public, will also add considerably to the appearance of the park.

9. RUCHILL PARK (53 Acres).

This was also acquired in 1892 to meet the wants of the crowded districts north of Cowcaddens and New City Road and the rapidly increasing population of Maryhill. Its acquisition, along with the erection of Ruchill Hospital, which adjoins the park, has led to many improvements in that part of the city, notably the construction of that fine roadway, Bilsland Drive, which forms a very important and convenient connection between the Springburn and Possilpark and Maryhill districts.

The ground, originally a piece of poorly farmed land, crowned with a spoil heap of tilly clay and blaes, was anything but an ideal site for a public park. Much labour was necessary to bring it into a condition worthy of the city, and, while its proximity to various manufactories whose deleterious emanations prevent any but the hardiest trees to exist, it is proving a useful and popular resort. Its peculiar contour prevents many forms of equipment enjoyed by other parks, but it gains in possessing points of vantage from which views are obtained of the city and districts beyond unequalled by any with perhaps those from the Queen's Park. Apart from the vegetation, Ruchill supplies for the northern what Queen's does for the southern side of the city.

10. MARYHILL PARK (5½ Acres).

This small park, which is situated near the extreme north end of the city, was likewise acquired in 1892. It serves as a quiet retreat for old and young, and will become more appreciated as the ground in the vicinity gets built upon.

11. GOVANHILL RECREATION GROUNDS (4 Acres).

In fulfilment of their obligations under the City Extension Act, the Corporation acquired this ground in 1894, and immediately thereafter laid it out as a children's recreation ground. As this form of recreative ground has admirably met its purpose, it may prove interesting to many studying these subjects. The area is nearly square, and is divided into two parts, and fenced off—one is laid down with ashes, whereon boys under twelve years of age can play football and other games. The upper part is in grass, whereon small children can disport themselves. In this part a small gymnasium has been fitted up, and an elderly attendant is put in charge to keep order. In the centre is a shelter and conveniences for both sexes. Around the margin is a border of trees and shrubs and a few flower beds, also a gravelled footpath, with seats at intervals, for the use of mothers with babies, where they can be safe from the games and romping of the older children.

12. BUNHOUSE GROUNDS (6½ Acres).

This area was acquired in 1895, and used purely as a football and games ground by the youth in the neighbourhood. It was used as the site of the Machinery Hall of the Glasgow International Exhibition in 1901, and has just been restored to its ordinary uses. Much could be done to make this an ideal recreation ground, but until the question of its ultimate use be decided probably nothing further will be done. It will be a matter for regret if it is not retained and developed as a purely recreative place for the growing youth of the city.

13. BELLALHOUSTON PARK (185 Acres).

The acquisition of these lands in 1895 was another example of looking ahead for future requirements. Lying on the south-west boundary of the city, it served, until the extension of the Corporation tramway system, the communities of Govan and Kinning Park perhaps more than Glasgow. Glasgow can afford to be generous to her children, whether they appreciate her acts or not. Beyond some minor works to suit the public convenience, nothing has yet been done to lay out the grounds, though probably in the near future a start will be made to provide more facilities for the pleasure and recreation of the citizens. An eighteen-hole golf course is the only form of recreation yet provided for. The popularity of this park lies in the amount of space for perambulation and the attractive views obtained from the hill, which forms the central part, and dominates the grounds. An addition of 7½ acres was made in 1901 by the purchase of a part of Dumbreck lands from Sir John Stirling-Maxwell, Bart., and in 1903 the lands of Ibroxhill were purchased to provide a better entrance from the city and to preserve the well-wooded grounds which naturally form part of the park. This later acquisition not only saves the amenities of the park, but adds much to that of the district generally. To recoup the Corporation for this later purchase, an equal area of the first purchase is to be feued for building purposes.

14. TOLLCROSS PARK (83½ Acres).

The difficulty in securing a suitable site for a park to meet the ever-increasing population in the eastern districts of the city was solved through the agency of a well-known and worthy citizen, which enabled the Corporation to acquire the mansion and policies of Tollcross House in 1897. This unique property was long in the possession of the late Mr. James Dunlop, whose planting did much to improve the grounds, which are generally well wooded with several distinct generations of trees of the same species. The natural beauty is much enhanced by a small stream which runs through the grounds. So well handled had the property been in the formation of paths through it, that no outlay beyond widening these pathways and adapting some buildings for public convenience was required by the Corporation before opening the park to the public, which was done by Lord Provost Sir David Richmond on the occasion of the late Queen Victoria's Diamond Jubilee. The interest and utility of the park was enhanced by the late ex-Bailie A. G. Macdonald presenting his glass houses and collection of plants to the city for this park, and which, when re-erected and extended, formed the nucleus of the present block of conservatories. Later, a suitable bandstand was erected, and in 1900 a small piece of ground, about three-fourths of an acre in extent, was purchased to save the belt of trees at the west margin of the park. After this last purchase was completed, the west lodge was re-modelled, and suitable waiting-rooms built adjoining to suit the mass of visitors who hail from the city. The old kitchen garden has been converted into a reserve nursery for the parks, and the collection of trees and shrubs are yearly added to, so that in time this fine park will possess plant features of no ordinary degree.

15. RICHMOND PARK (44 Acres).

For many years the necessity of securing an open space on the south side of the river to meet the wants of the rapidly extending south-eastern districts of Polmadie and Hutchesontown, east from Gorbals Cross, was apparent to the Corporation. After much difficulty the lands which comprise this park were purchased in 1897. Operations were immediately commenced by sweeping away some disreputable dwellings, and surely, if slowly, the transformation of this "dismal swamp" is taking place. As the various sections are completed they are opened to the public. The first portion was opened in 1899 by Lord Provost Sir David Richmond, after whom the park is named. Advantage was taken to widen Rutherglen Road, so that this important thoroughfare was much improved. The erection of a footbridge across the Clyde and formation of a roadway from opposite Polmadie Road to Glasgow Green has provided a more convenient and better access north and south across the river than the old ferry boats. The formation of what will be the largest pond in any of our city parks is nearing completion, and the erection of suitable offices for the working of the park is also in hand. It is expected that a considerable part of the eastern section will be ready for opening early in the autumn. The remaining parts may

take another year to finish. When completed, this park will form an important feature in the park system of the city.

Apart from the foregoing, the Parks Department own or keep in order twenty smaller spaces, varying in area from $\frac{1}{4}$ to 2 acres, also six disused graveyards, from $\frac{1}{4}$ to $\frac{1}{2}$ an acre in extent, as minor open spaces.

In most of the parks provision is made for the more active games, such as football, golf at Alexandra or Blackhill and in Bellahouston, while gymnasia are erected at Glasgow Green, one for adults and two for children, and one for children at Govanhill Grounds. Two bowling greens were opened last year in Glasgow Green, and these proving successful, the Corporation sanctioned the formation of two at each of the following places, viz., Kelvingrove, Queen's, and Springburn, and these will be made this year.

For many years music has been provided during the summer months in all the parks, and in the winter gardens of Glasgow Green and Springburn Park during winter. The number of performances in this year's programme is 285, and the cost is estimated at £2,500.

The average number of employees last year was 280, and the amount spent in wages was £19,000.

It may be stated that for the past ten years all the parks have been laid out by the staff and the employment of ordinary labour as occasion demanded.

One feature of the parks of the city is the great variety in their character, and, as can be seen by an examination of the plan of the city, their fairly regular distribution around its area. Another very important matter is their accessibility by means of the splendid tramway service.

While Glasgow has done well in providing parks in the past, it has not by any means too many for the ever-increasing population. The noble gift which Mr. Cameron Corbett, M.P., has promised in the beautiful estate at Thornliebank as a park should not only incite other gentlemen to do likewise, but keep the Corporation always alert to secure other places within reasonable distance of the city.

LIBRARIES.

THE Public Libraries administered by the Corporation are:—

- 1st. The Mitchell Library.
- 2nd. A series of District Libraries.

In addition to the above, the Corporation is represented on the Boards of Management of Stirling's Library and Baillie's Institution. The Lord Provost is *ex officio* President of Stirling's Library, and three members of the Corporation are sent as Directors. One member of the Corporation is nominated a Director of Baillie's Institution.

THE MITCHELL LIBRARY.

The Mitchell Library has its origin in the bequest by the late Mr. Stephen Mitchell to the Town Council of the residue of his estate, to "form the nucleus of a fund for the establishment and endowment of a large public library in Glasgow, with all the modern accessories connected therewith."

Mr. Mitchell was a native of Linlithgow, in which town his family had been established as tobacco manufacturers since 1723. He was born 19th September, 1789; joined the family business in 1809; assumed the direction of it about 1820; retired from business in 1859; and died at Moffat, from the effects of an accidental fall, 21st April, 1874. The tobacco manufacturing business was removed from Linlithgow to Glasgow in 1825, and is still actively and extensively carried on. Mr. Mitchell took no part in public affairs, but he travelled much, and was a man of wide reading, in which characteristic may perhaps be seen the suggestion of his munificent bequest.

The amount paid by Mr. Mitchell's trustees to the Town Council was £66,998 10s. 6d. The principal provisions of the trust deed, which were embodied in a constitution, were the following:—That the library was to be known as the Mitchell Library; that the amount of the bequest was to be allowed to remain at interest until it amounted to £70,000, or, if thought necessary, to a larger amount, before a commencement was made; that, in the selection of books to form the library, no books should be excluded on the ground that they contravene present opinions on political or religious questions; that the library should be freely open to the public under suitable regulations; that contributions by others of money or of books might be accepted; and that collections of books might be kept together and known by the donor's or other distinctive name.

In accordance with the constitution, the committee appointed by the Town Council proceeded with the organisation of the library, which was opened for public use, in temporary premises towards the east end of Ingram Street (No. 60), in November, 1877. The principles upon which the selection of the books proceeded were as follows:—That the library should represent every phase of human thought and every variety of opinion; that books of permanent value and standard interest should form the principal portion of the library, and that modern books of value and importance should be added from time to time; and that it should, as far as possible, contain those rare and costly works which are out of the reach of individual students and readers. It was organised as a reference or consulting library rather than as one for the circulation of books.

When the library was opened to the public it contained 14,000 volumes; the number issued to readers on the first day, 5th November, 1877, was 186. The rapid development of the library and of its usefulness, which has been the most characteristic feature of its history, at once became evident, and demonstrated the reality of the public need which the library supplied. At the end of 1880 it contained 33,000 volumes; and, taking the number at five-year intervals, it became, in 1885, 62,000 volumes; in 1890, 87,000 volumes; in 1895, 120,000

volumes; in 1900, 142,000 volumes; and at the middle of 1904, over 160,000 volumes. In extent, variety, and value the library now takes rank with the chief reference libraries of the kingdom. For a considerable time the increase of the number of visitors to the library kept pace with the growth of the collection itself, and it was checked only when the accommodation provided had been long overtaxed. During the year 1883, and following years, the overcrowding became such as to render the use of the library inconvenient and even disagreeable, and the inevitable result was a diminution in the number of its frequenters. The maximum in the original quarters of the library was reached in 1885, when 468,056 volumes were consulted. During the remaining five years of the occupancy of the Ingram Street rooms the attendance somewhat lessened, but it was to the last larger than could be accommodated with comfort.

The urgent need for a more suitable building had for years engaged the anxious consideration of the Library Committee. The completion of the City Chambers in George Square brought the first really practicable opportunity of dealing effectively with the question. The Gas and Water Departments, with others, were then removed from the buildings previously occupied; and the sanction of the Town Council was obtained for the purchase of the office of the Water Commissioners in Miller Street as the future home of the Mitchell Library. The preparation of the building for its new purposes involved very extensive alterations, including the erection of the commodious and handsome reading hall on the rear portion of the site. This work, and the necessary furnishing with book-cases and other requirements for the public use and for the administration, were completed in the autumn of 1891, and the library was re-opened on 7th October by the late Marquess of Bute, who delivered an address at once scholarly and sympathetic, wholly appropriate to the occasion.

During the following years the history of the library was in some respects a repetition of its earlier experiences. The much-improved conditions as affecting the readers induced a large increase in their numbers; and in 1894 the attendance again overtook the accommodation. In that year 519,196 volumes were issued for the use of readers, representing a daily average of 1,731. This number, however, was only possible as a result of much overcrowding, and it is not surprising that during the succeeding years the work of the library has exhibited some fluctuations. In 1895 the number of volumes consulted was 513,459, and in the following years the numbers were 474,013, 486,578, 451,634, 426,065, 454,895, 467,973. The year 1902 showed a considerable increase, the total being 494,273; and in 1903 the improvement was still more marked, the number rising to 527,410, which is the largest ever reached in one year in the history of the library.

The whole number of the volumes which have been issued for the use of readers since the library was opened is approaching eleven millions; and it is estimated that the use which has been made of the current numbers of the large collection of selected periodicals, now about 500, which are placed in racks and on tables in the magazine room, and for which no application form is taken, is little, if at all, less in amount.

It is impossible in the space here available to indicate in any detail the contents of the library. The endeavour has been to provide as full a representation as possible of each department of literature, excepting prose fiction, and with some measure of proportion. With this there has been special effort to develop some particular branches, and collections have been formed of books and papers relating to Glasgow in all its interests, of editions of Burns and Scottish poetry, and generally of Scottish literature in all departments. In pursuance of the policy adopted at the commencement, large and important works have been secured in all branches of knowledge; and especially in the departments of the fine and useful arts, in manufactures, in applied science, and in natural history will be found works quite out of the reach of the ordinary reader and student except for libraries such as this. It has been recognised also that, as the chief public library of an important district and city, the Mitchell Library should collect and preserve the smaller and more ephemeral publications of the day, which, unless so kept by a public library, go out of existence, and become lost to the future student of history or of sociology. Accordingly, the library now possesses large collections of pamphlets, not only on current matters, but to a large extent dealing with the controversies of earlier times. Still another feature of the library is its extensive collection of periodical publications, which, by their mere bulk, are impossible to private persons, but which, nevertheless, will be of the utmost value as works of reference.

In Mr. Mitchell's trust deed he provided that gifts by other persons might be accepted. The occasions for the exercise of this permission have been numerous, and the library owes a very large proportion of its contents and many of its most valued treasures to generous friends and well-wishers. About a third of the volumes now in the library are due to this source. One of the most important benefactions hitherto is the bequest of the late Bailie James Moir, who was a member of the Library Committee, and who took the liveliest interest and found much gratification in its growth. He left his own excellent collection of about three thousand five hundred volumes, and (subject to an annuity) a sum of eleven thousand five hundred pounds to be applied in the purchase of books. The number of volumes in the "Moir Collection" is now about 21,000, and the capital sum of the money bequest is not much diminished. Other bequests of money have been made by Councillor Logan (also a member of committee), £500; Mr. Louis Campbell, £4,000; Mr. James M'Pherson, £500; Mr. Alexander M'Donald, £100.

The latest and the greatest of these important gifts is the Jeffrey Reference Library, bequeathed, together with the residue of his estate, by the late Mr. Robert Jeffrey, to the Lord Provost, Magistrates, and Town Council of the City of Glasgow, in their capacity of trustees for and managers of the Mitchell Library, to the end that the collection might be preserved together and made available for public use. The library contains over 4,000 volumes, and includes works of high value and great rarity. It is especially rich in important works in various departments of natural history, especially ornithology; in works on the antiquities of Egypt, Greece, Rome, and other countries; and in works dealing with the various branches of the fine arts. The residue of the estate, which mean-

time is chargeable with some annuities, is estimated to amount to more than £20,000. It was found impossible to provide for the Jeffrey Reference Library in the present Mitchell Library building in Miller Street, and it has been temporarily placed in the old Museum building in Kelvingrove Park, where it is open to visitors for general inspection, and to holders of readers' tickets, granted in accordance with the special rules and regulations, drawn up to give effect to the wishes and intentions of the testator, for reference and consultation.

The donors of books have been very numerous; only a few of the chief can be named:—The Senatus of Glasgow University; Mr. Richard Chalmers; Mr. Alex. Gardyne; ex-Lord Provost Sir James Bell, Bart.; the Bellahouston Trustees; the Trustees of the British Museum; the India Office; the Lords of H.M. Treasury; the United States Government, largely through the good offices of Mr. W. R. Smith, of Washington; the representatives of the late Dr. T. W. Jenkins and of the late Mr. T. D. Smellie.

The growing insufficiency of the present buildings in Miller Street for the ordinary work of the library, and the necessity of providing suitable permanent accommodation for the Jeffrey Reference Library, have led the Corporation to decide on the erection of an entirely new building. For this purpose they have authorised the transfer from the General Department to the Libraries Committee of the piece of ground between St. Andrew's Halls and North Street. After deduction of a strip required for the improvement of the halls, the ground consists of a square of about 187 feet each way, and contains 3,880 square yards. This space being larger than is required for the present, the proposal is to erect a building covering about 2,000 square yards, the remainder being reserved for extensions which will become necessary in the future, and meantime being maintained as a small open space. The estimated cost of the new building is about £37,500. With the completion of the new building, the accommodation of the Mitchell Library and its associated collections will be placed on a satisfactory basis for a lengthened period to come, and the very large and constant use made of the library by the public will be accomplished under more favourable conditions than have hitherto obtained.

THE DISTRICT LIBRARIES.

The question of the provision of Branch or District Libraries for the city was determined at a meeting of the Town Council in June, 1898, presided over by the present Convener of the Libraries Committee, ex-Treasurer Alex. Murray, then Senior Bailie. A motion by Bailie D. M. Stevenson that Parliament be applied to for a special Act to enable the Corporation to establish libraries in different parts of the city was carried by a majority. In the following year a Bill was promoted for tramway and other purposes, in which clauses relating to public libraries were inserted. The library portion of the Bill passed without opposition.

The powers conferred by the clauses are generally similar to those which follow adoption of the Public Libraries Act, and include power to acquire lands and buildings and to levy a rate for the support of the libraries, the rate not to exceed one penny in the pound of rental, and to be paid half by the occupier, half by the owner.

Before resolving to exercise these powers the Corporation directed that a report should be prepared embodying a scheme for a general system of libraries throughout the city. Accordingly a report was drawn up and submitted, and, after discussion, was generally approved.

The report recommended the establishment of eight District Libraries and of five Reading Rooms. Each of the libraries was to include a lending or circulating department, a collection of reference and other books for consultation within the building, a large general reading and news room, and reading rooms for ladies, for boys, and for girls, with necessary staff and administrative accommodations.

But the position was greatly changed by the receipt by the Lord Provost (Sir Samuel Chisholm, Bart.) of the following letter from Dr. Carnegie:—

“Knockderry Castle, Cove,
“Dumbartonshire, 15th May, 1901.

“MY DEAR LORD PROVOST,

“It will give me pleasure to provide the needed one hundred thousand pounds for branch libraries, which are sure to prove of great advantage to the masses of the people. It is just fifty-two years since my parents, with their two little boys, sailed from the Broomielaw for New York in the barque *Wiscassett*, 800 tons, and it is delightful to be permitted to commemorate the event upon my visit to you.

“Glasgow has done so much in municipal affairs to educate other cities and to help herself that it is a privilege to help her.

“Let Glasgow flourish, so say we all of us Scotsmen throughout the world.

“Always yours,

“ANDREW CARNEGIE.

“P.S.—My cashier will be instructed to honour drafts to extent named as money is needed for payments.”

The intimation of this great gift led to a desire for a revision and extension of the scheme which had been approved. An amended scheme was submitted, in which the number of the libraries to be provided was increased to fourteen, with three reading rooms, and this revised scheme was, after consideration, adopted generally.

Under the new scheme the libraries were to be of three grades, the largest being placed in the most densely populated districts. First-grade libraries were placed at Bridgeton, Townhead, Woodside, Anderston, and Gorbals. Second-grade libraries at Parkhead, Dennistoun, Springburn, Maryhill, Kingston, and Govanhill. Third-grade libraries at Hillhead, Crossmyloof, and Hutchesontown. (The last-named was, by subsequent resolution of the Town Council, elevated to the status of a second-grade library.)

Reading rooms were to be provided at Possilpark and at East Pollokshields, in addition to the reading room established in the Whitevale Baths building under the bequest of the late Mr. John Rankin, and called the Rankin Reading Room. The Rankin Reading Room was opened in January, 1902, and has enjoyed a good measure of public appreciation, the

daily attendance of readers being from 400 to 500. It has now been decided to substitute a library of the third grade for a reading room at East Pollokshields.

The first practical step taken by the Corporation in the direction of putting the Act into operation was a decision to establish one of the district libraries in the large halls of the front building, first and second floors, attached to the Baths building in Main Street, Gorbals. These rooms were cleared and suitably arranged and fitted accordingly, and the reading rooms were opened in November, 1901, and the lending library in August, 1902. All departments of this library have, since they were opened, been utilised to the fullest extent, the attendance in the reading room exceeding one thousand daily, and the issue of books from the lending library being more than 400 per day.

Considerable progress has been made towards the realisation of the scheme adopted. Sites have been secured for the following libraries, and plans for the buildings have been accepted for all except the last two :—

Kingston (joint-building with public halls and police station), Paisley Road, opposite Pollok Street. Architect—Mr. A. B. M'Donald, City Engineer.

Anderston, M'Intyre Street. Architects—Messrs. Stewart & Paterson. Woodside, St. George's Road. Architect—Mr. J. R. Rhind.

Springburn, corner of Ayr Street and Vulcan Street. This site is the gift of Messrs. Neilson, Reid, & Co., the eminent engineers. Architect—Mr. W. B. Whitie.

Maryhill, Wyndford Street, opposite Burgh Hall. Architect—Mr. Rhind.

Govanhill and Crosshill, corner of Langside Road and Calder Street. Architect—Mr. Rhind.

Dennistoun, near the foot of Craigpark Street. Architect—Mr. Rhind. Bridgeton, Landressy Street. Architect—Mr. Rhind.

Parkhead, corner of Great Eastern Road and Helenvale Street. Architect—Mr. Rhind.

Hutchesontown, M'Neil Street. Architect—Mr. Rhind.

Townhead, Castle Street, opposite Kennedy Street.

Pollokshields East, corner of Kenmure Street and Leslie Street.

With the exception of the Kingston Library, the plans for the various District Libraries have been selected from designs submitted by architects in open competition.

The various buildings are admirably adapted for the purpose they are designed to serve, and in architectural character will form very acceptable additions to the amenity of their several districts. It is expected that three (Kingston, Anderston, Woodside) will be opened this year, and Springburn, Govanhill, Maryhill, Dennistoun, and Bridgeton will be completed in the early months of 1905.

The cost of the library buildings (including the fittings) is estimated at—

First-grade libraries,	...	...	...	...	£8,500
Second-grade libraries,	...	...	...	...	7,000
Third-grade libraries,	...	...	...	...	5,000

Each library will open with a stock of from 6,000 to 10,000 volumes, and will be provided with a good collection of newspapers and periodicals.

CITY IMPROVEMENTS.

THE Department of the Corporation of Glasgow, popularly known as the "City Improvement Trust," was constituted under the Glasgow Improvements Act, 1866. The condition of matters which give rise to, and the objects contemplated by the constitution of the Trust, cannot be better described than in the words of the preamble of the Act, which states—"Whereas various portions of the City of Glasgow are so built, and the buildings thereon are so densely inhabited, as to be highly injurious to the moral and physical welfare of the inhabitants, and many of the thoroughfares are narrow, circuitous, and inconvenient, and it would be of public and local advantage if various houses and buildings were taken down, and those portions of the said city reconstituted, and new streets were constructed in and through various parts of said city, and several of the existing streets altered and widened and diverted, and that in connection with the reconstitution of those portions of the city provision was made for dwellings for the labouring classes who may be displaced in consequence thereof,"

The congested areas referred to were situated in, or immediately contiguous to, that portion of the city known as "Old Glasgow," including Gallowgate, High Street, Trongate, and Saltmarket; and also in the precincts of Main Street, Gorbals.

The Lord Provost, Magistrates, and Council, and their successors in office, were appointed as Trustees for executing and carrying into effect the provisions and purposes of the Act.

The scheduled lands extended to about 90 acres. The Act, *inter alia*, empowered the Trustees (1) to form 39 new streets, and to alter, widen, or otherwise improve 12 existing streets; (2) to purchase lands by agreement; (3) to take down the whole or any part of the buildings situated on any part of the lands acquired, to lay out the said lands of new in such a way and manner as they might deem best, to sell or dispose of the ground or buildings, or lease or feu the same, or to erect buildings thereon, or dispose thereof, or lease the same, and generally to deal with the lands and houses acquired by them under the Act as absolute proprietors; (4) to erect and maintain on any of the lands acquired by them such dwelling-houses for mechanics, labourers, and other persons of the working and poorer classes as from time to time they might think expedient, and to let the same when so erected and fitted up to the class of persons mentioned at such weekly or other rents, and upon such terms and conditions as might be thought fit, or sell or dispose of the same; and (5) to acquire by agreement ground for, and to form and lay out, a public park in the north-eastern district of the city at a sum not exceeding £40,000.

The amount which the Trustees were authorised to borrow on mortgage or otherwise for carrying out the purposes of the Act was £1,250,000, but by the Glasgow Improvements Amendment Act, 1880, this amount was increased to £1,500,000. An assessment was also authorised to be levied upon occupiers only for defraying the expenses to

be incurred in carrying out the objects of the Act, which was not to exceed 6d. per £ for the first five years, and 3d. per £ for a further period of 10 years. By the Act of 1880 these restrictions as to the time during which the assessment was to be imposed were removed, and the maximum rate was fixed at 2d. per £ for an indefinite period.

The provision in the 1866 Act, putting the assessment wholly upon occupiers, was afterwards regarded as a blot upon the statute, having regard to the fact that the owners as well as the occupiers of property all over the city were equally interested in, and would derive mutual benefits from, the improvements to be carried out within the scheduled areas. In 1892, therefore, an attempt was made to have this defect in the 1866 Act removed, but Parliament refused at the stage at which operations under the Act had then reached to make any change in the incidence of the assessment.

The period given for the compulsory purchase of lands scheduled under the 1866 Act was five years, but as regards the lands not then acquired this period was extended to five years longer by the Glasgow Improvements Act, 1871.

Armed with the extensive powers thus conferred upon them by the Legislature, the Trustees, as soon as possible after the passing of the 1866 Act, proceeded to acquire by compulsion or agreement all the properties comprehended within the scheduled areas. In addition to acquiring those properties, the Trustees, in 1871, under the powers of the 1866 Act, purchased by agreement (1) the lands of Kennyhill, in the north-eastern district of the city, extending to 89 acres, at the price of £40,000; and (2) the lands of Overnewton, in the western district of the city, for £35,433 12s. 4d., and the lands of Oatlands, in the eastern district of the city, on the south side of the River Clyde, for £23,950. These prices do not, of course, include the sums which were subsequently expended by the Trustees in forming streets and sewers and laying out the lands at Oatlands and Overnewton for feuing purposes. Upon a portion of the lands of Kennyhill, containing 63 acres, there was formed what is now known as the Alexandra Park, which was completed and handed over to the Parks Trustees in 1872, and the remainder of the lands was conveyed to the Parks Trustees to be appropriated by them for building purposes.

Although the Act of 1866 authorised the Trustees themselves to erect, and seemed to contemplate that they would erect, new buildings upon the lands acquired by them, this power practically remained unexercised until 1889; the only buildings which the Trustees had erected up to this time being two model tenements in Drygate, and the model lodging-houses in Drygate, Greendyke Street, Portugal Street, Clyde Street (Calton), North Woodside Road, Hydepark Street, and East Russell Street, to which special reference will afterwards be made.

It would appear that the Trustees, after clearing the lands acquired by them within the compulsory areas of the dilapidated and insanitary buildings standing thereon, which to a large extent they did as soon as possible after acquiring the same, and forming new, and altering, widening, and otherwise improving the existing streets, as provided for in the Act, expected that the lands within the said areas, as well as the



CITY IMPROVEMENT BUILDINGS.

feuing lands of Overnewton and Oatlands, would be taken up by private enterprise for the erection thereon of modern dwelling-houses and business premises, and that at prices which would largely recoup the rate-payers for the expenditure which they would be called upon to bear by way of assessments in carrying out the purposes of the Act. This expectation was to a large degree being realised both as regards the feuing grounds at Overnewton and Oatlands, and the cleared ground within the scheduled areas, when it was abruptly terminated by the commercial crisis that occurred in 1878, which brought about a complete collapse of the property market, and, so far as Glasgow was concerned, culminated in the failure of the City of Glasgow Bank. After this panic, builders ceased either to purchase or to feu the ground remaining in the hands of the Trustees, even although it was publicly advertised for disposal at prices far below the normal value. At this period also, a great many of the old properties acquired for demolition were still standing, and as the maximum assessment leviable under the Act was now limited to 3d. per £, the trustees were forced to conserve a considerable number of these properties by making repairs and alterations thereon in order to derive a certain amount of revenue therefrom. In this way the scheme for reconstructing the scheduled areas sanctioned and contemplated by the Act of 1866 was for a time, to a large extent, arrested.

As already mentioned, the whole of the seven model lodging-houses referred to—one being for females, and the remaining six for males—had by this time been opened. The erection of these houses was largely, if not entirely, brought about in this way. Within the scheduled areas there existed, at the date of the passing of the 1866 Act, a great number of what were designated common lodging-houses conducted by private enterprise, where men and women were huddled together promiscuously in dark and unventilated rooms, without any of the conveniences requisite for decent living, not to speak of healthful existence. These houses, besides being hot-beds of vice and misery, were also centres for the propagation of disease. To destroy such insanitary and unsavoury abodes, however, without providing accommodation of a higher and healthier kind for the classes who, whether from choice or necessity, frequented them, would have been not to remedy, but to intensify, the evil. The Trustees accordingly, at a very early date after obtaining their Act of 1866, took this matter in hand, and in rapid succession constructed and equipped the seven model lodging-houses, which are still retained and successfully carried on by them, even from a financial point of view. The houses are all provided with a common dining-room, a kitchen with utensils and fire available for cooking at any hour of the day, a large recreation room, and ample lavatory and bathing conveniences. Each lodger has a separate cubicle, with spring mattress, pillow, sheets, blanket, and bedmat. The charges range from 3½d. to 6d. per night. A provision shop is attached to all of the homes except one, where uncooked food can be purchased at outside market prices. Each house is managed by a resident superintendent and warders, and all the houses are visited by members of the Improvements Committee once a fortnight. The seven houses give accommodation for 2,430 persons nightly, and rarely are the houses, taken all over,

unoccupied to an extent exceeding 3 per cent. The total cost of the seven houses (including the sites and equipment) has been £109,343, and on this amount, in addition to writing off as depreciation the sum of £19,966, there was a return for the financial year ending 31st May, 1903, of £4 8s. 6d. per cent. on their cost, and £5 8s. 3½d. per cent. on their cost as reduced by the sum written off for depreciation. The best evidence that the erection and conduct of those houses by the Trustees has been a complete success is to be found in the fact that the example has been followed both by private enterprise and by other municipalities in the towns and cities where the model lodging-house has been established. It may be of interest to mention that the model lodging-houses some time ago established in London, under the auspices of the late Lord Rowton, are upon the lines of the houses erected by the Trustees, and that Lord Rowton personally visited and inspected several of these houses prior to commencing his operations in the Metropolis.

Any narrative of the operations of the Trustees would be incomplete without reference to the "Family Home," situated in St. Andrew Street, off Saltmarket, and which was opened on 14th March, 1896. The construction and equipment of this building have cost £17,609. It was designed and erected to afford accommodation for deserving and respectable widows or widowers, belonging to the working classes, having one or more young children, with no one to look after them. After some years' experience it was found that its benefits were largely being taken advantage of by widowers and their families, and it was entirely restricted to their use. The house contains 160 single bedrooms, plainly furnished, each capable of accommodating one adult and three children; a common dining-room and kitchen, with gas fires and steam cooking boilers; a nursery; recreation rooms; baths and lavatories; and the building throughout is lighted by electricity and warmed by a hot-water heating installation. The rent of a bedroom is 5s. 6d. per week; if the number of children is more than three, accommodation is found for the additional children beyond that number in some other room at 8d. per week each. Regular meals are cooked and supplied to the inmates at the lowest possible charges, and children are boarded at an average of 1s. 7d. per week. The Home is managed by a superintendent and matron, with a staff of nurses and other servants. The children who are under school age are tended by the nurses during the day, while the parents are at work, and the older children are sent to school. The Home has steadily grown in favour with the class of persons for whom it was intended. So far the working expenses have, each year since the opening, resulted in a loss, but this loss is being somewhat reduced in proportion to the increased number of residents.

For about ten years after 1878 the action of the Trustees in dealing with the vacant ground and old properties still in their possession seems to have been paralysed by the fear of having to call upon the rate-payers for an increased assessment. Even necessary repairs upon these properties were delayed as long as possible, and when executed were kept down to a minimum. At the end of this period of *laissez-faire*, the properties still in the hands of the Trustees were probably the worst and most insanitary in the city.

In 1888, however, active measures were recommended by the Trustees for the demolition of the remaining old properties, and for the erection upon the sites thereof, as well as upon the other vacant ground held by them, of new and improved dwellings. The first two blocks erected were on the east side of Saltmarket, and consisted of tenements of shops and dwelling-houses. However averse the Trustees may have been to the new policy, after having once again put their hands into the mortar-tub the work of demolition and reconstruction proceeded apace, with the result that practically the whole of the areas scheduled under the Act of 1866 and the surplus lands taken over by the Trustees from the Police Commissioners in 1894 have now been covered with buildings of a substantial and modern character. In two or three instances only have old properties been re-modelled and improved, and it is intended that these should be left standing for a few years yet.

In order that as little loss as possible might accrue to the rate-payers, the Trustees, in all cases where the lands to be dealt with had valuable street frontages, erected thereon dwellings with shops and other business premises on the ground floor, while the upper floors were devoted to dwelling-houses for the working classes. Upon the less valuable sites, tenements consisting exclusively of dwelling-houses, also suitable for the working classes, were erected.

In all, twenty-seven blocks of buildings have been constructed upon the lands in question. There are 200 shops and 1,362 dwelling-houses in these buildings. Under the Improvements Act of 1897—which will be referred to at greater length in the latter part of this article—eight blocks have been built, which contain 97 shops or other business premises and 360 houses. Owing to the high cost of acquiring the land and the buildings now demolished in these new areas, which are in central positions and mostly contiguous to one or other of the areas acquired under the Act of 1866, two blocks have been constructed entirely for business occupation. As has been already stated, one or two of the old properties acquired under the earlier Act are still standing, having been reconstructed internally, and provide a number of families with cheap house room. The following table shows the number of houses owned by the Improvements Department:—

	1-Apart- ment Houses.	2-Apart- ment Houses.	3-Apart- ment Houses.	Houses of larger Size.	Total.
Erected under Act of 1866, - -	362	837	152	11	1,362
Erected under Act of 1897, - -	112	205	45	...	360
Old Properties reconstructed, -	94	92	82	...	268
	568	1,134	277	11	1,990

The total population provided for by the Trustees in these houses, the seven model lodging-houses, and the Family Home may be taken

at 11,500. The minimum rents charged for the one-apartment houses is £4 10s. per annum; for the two-apartment houses, £6 16s.; and for the three-apartment houses, £12 9s.; while the maximum rents are £8 15s., £14, and £21 per annum respectively.

The lands of Overnewton and Oatlands had before this time all been feued out, and many of the annual feu-duties or ground rents, in respect of which the feus were given out, had been sold for prices equal to twenty-three years' purchase and upwards. The only portion of the lands of Oatlands retained was a small piece of ground close to the river-side, which has been formed into an open space and children's playground.

There are two special matters connected with the City Improvements Scheme which may now be briefly referred to. In 1876 the Trustees took the opinion of Counsel (Lord M'Laren) as to the legality of inserting in the charters of all the lands which might be feued by them a clause prohibiting premises for the sale of intoxicating liquors from being erected thereon. Counsel entertained great doubt as to the validity of a resolution of this kind, if made applicable to the whole estate vested in the Trustees by the Act of 1866, but advised that if the prohibition were confined to any one particular area, and constituted a real burden upon the ground, it would in his opinion be legally binding and operative. Acting upon his advice, the Trustees selected what is known as the "Calton Area" as the one upon which the prohibition should be imposed, the result of which has been that not a single public-house has been, or can be, established in any of the new properties erected within that area upon the ground feued from the Trust. As a step further in this direction of social reform, the Trustees in 1890 adopted a resolution to discontinue all licensed premises existing in the properties belonging to them at the end of the then current leases, and to grant no new leases for such premises, either in these properties or in any new properties which they might erect. The result of this resolution has been that not one public-house now exists in the very numerous properties of which the Trustees are the owners. From time to time, as the properties within the scheduled areas were acquired, they were put into the hands of outside factors, who, until the subjects came to be demolished, attended to any repairs requiring to be made thereon, collected the rents, and accounted periodically for the same to the treasurer of the Trust. This system continued for about twenty-six years. At the end of this time the number of old and new properties belonging to the Trust was so great that a correspondingly large number of factors had to be employed to look after them. In 1892, however, it was resolved to inaugurate a new system by dispensing with the services of outside factors, and appointing a general manager for the Trust. Mr. William C. Menzies was accordingly appointed to this office. His duties are to take a general supervision of the whole properties of the Trust, including the lodging-houses and Family Home, to collect the rents and other revenue receivable therefrom, and to see that all necessary repairs are at once attended to and properly executed. Under the Manager there are a number of caretakers, to each of whom is allocated a certain share of such properties as more particularly need to be supervised in this way, and in one of the houses situated in the properties assigned



FAMILY HOME, ST. ANDREW STREET.

to him the caretaker has his residence. This new method of management has proved very satisfactory. It has resulted in a financial saving, and brought all the properties and the tenants occupying the same more directly under the control of the Trustees.

Before passing on to notice the additional powers granted to the Corporation by the Act of 1897, some further reference may be made to the assessment sanctioned by the 1866 Act. The maximum and the minimum rate and the period during which it might be imposed have already been mentioned. The maximum rate of 6d. per £ was only levied for the first year. The following year it was fixed at 4d. per £, and remained at this rate till 31st May, 1871. Thereafter it was gradually further reduced to 3d. per £ for two years, 2d. per £ for eleven years, 1½d. per £ for three years, 1d. per £ for five years, ½d. per £ for three years, and ¼d. per £ for the year 1895-96. Since the last-mentioned year the financial position of the Trust has been such that it has not been necessary to impose any assessment under the 1866 Act.

The total amount of assessment received from the ratepayers from 1866 to 1897, when it ceased, was	£597,003 0 11
As at 31st May, 1903, the nett free assets over liabilities amounted to	28,616 17 10

The total cost of the schemes under the 1866 Act to the ratepayers from first to last may, therefore, be stated at ...	£568,386 3 1
------------------------------------------------------------------------------------------------------------------------	--------------

For this they have obtained—

- (1) The Alexandra Park;
- (2) 98,929 square yards of ground, applied in the formation of thirty new streets and in the improvement of twenty-six existing streets, being 34,259 square yards of street surface beyond what was contemplated in the original scheme; and
- (3) The sanitary and social amenities produced by the street, sewer, and other public works, which have cost £106,279 0s. 9d.

No sinking fund was provided for in the Act of 1866. By Section 6 of the Amendment Act of 1880, however, it is provided that, so soon as the Trustees have completed the works authorised by the 1866 Act, and shall have sold and realised the various properties acquired and held by them, the powers of assessment under the 1866 and 1880 Acts shall be leviable and applicable only to meet the expenses of carrying on and managing the Trust, and to provide and set aside as a sinking fund such an annual sum as shall, by accumulation, with compound interest thereon at the rate of 4 per cent. per annum, be sufficient to pay off in twenty years the whole of the money then owing by the Trustees.

Looking, however, to the financial position of the Trust, as shown by the following balance sheet, it does not appear that the provisions of

Section 6 of the 1880 Act will, so far as the sinking fund thereby provided for is concerned, require to be put into operation:—

SUMMARY OF BALANCE SHEET UNDER ACT OF 1866 AS AT 31ST MAY, 1903.

Liabilities.

Cash held on loan,	£1,273,490	2	5
Open Accounts,	6,810	13	8
Reserve Fund,	17,022	17	2
Balance of Free Assets,	28,616	17	10
	<hr/>		
	£1,325,940	11	1

Assets.

Tenement Buildings erected (valued by City Chamberlain and City Engineer, 1st Sept., 1899), ...	£396,060	19	4
Less Depreciation at 1 per cent.,	3,960	12	2
	<hr/>		
	392,100	7	2
Ground valued as above,	£442,727	13	10
Less Capitalised value of Un- redeemed Burdens,	19,122	3	9
	<hr/>		
	423,605	10	1
Osborne Street Wash-house and Dry- gate Laundry,	£7,240	1	0
Less Depreciation,	60	18	0
	<hr/>		
	7,179	3	0
Lodging-houses, including Family Home,	£133,703	14	8
Less Depreciation,	20,142	5	5
	<hr/>		
	113,561	9	3
Capitalised value of Feu-duties and Ground Annuals,	318,912	2	11
Tenements under construction (Overnewton),	110	19	0
Security, Stock, Cash, and Outstanding Accounts, ...	70,470	19	8
	<hr/>		
	£1,325,940	11	1

In 1896 the Corporation promoted in Parliament an Omnibus Bill, the principal objects of which, so far as relating to the City Improvement Trust, were (1) to obtain compulsory powers over six congested areas on the north side and one similar area on the south side of the River Clyde, for the purpose of removing the old and insanitary buildings and reconstructing the areas; (2) to widen Nelson Street from Trongate to Bell Street, which had been authorised by the 1866 Act, but never carried out; (3) to purchase, by agreement, any lands, not exceeding on the whole twenty-five acres, either within the city or within a radius of half-a-mile from the boundaries of the city, for the purpose of erecting thereon houses for the poorest classes; and (4) to impose a new assessment equally upon landlord and tenant to carry out those objects. The portion of the Bill

relating to these matters was keenly opposed by, *inter alia*, the Glasgow Landlords' Association, Limited, and the Wine, Spirit, and Beer Trade Association—by the latter for the reason apparently that there were a number of public-houses within the scheduled areas. Notwithstanding this opposition to the measure, it was successfully carried through Parliament without any clause whatever being obtained by either of the opponents named, and on 6th August, 1897, it received the Royal Assent under the title of "The Glasgow Corporation (Improvements and General Powers) Act, 1897."

The amount authorised to be borrowed under the 1897 Act for the improvements and other operations before referred to was £560,000, and of this amount £100,000 was to be applied exclusively in the purchase of the 25 acres of ground and the erection thereon of dwellings for the poorest classes, provided for in Section 12 of the Act. This section was amended by a Provisional Order Act, obtained in 1902, by which the Corporation were authorised to expend a sum of £150,000 additional to the £100,000 already provided under the Act of 1897.

As the price (£103,245 18s.) paid to the Police Commissioners for the lands and ground annuals taken over from them in 1893 had been met out of the £1,500,000 authorised to be borrowed by the Trustees under the Acts of 1866 and 1880, the borrowing powers under these two Acts were, by Section 15 of the 1897 Act, increased to the extent of the first-mentioned amount.

The new assessment authorised by the Acts of 1897 and 1902 was limited to 1½d. per £, and, in contrast to the assessment under the 1866 Act, which was entirely on occupiers, was to be levied equally upon landlord and tenant. A sinking fund was also provided for, of such an amount as to secure that the capital sums borrowed should be paid off within a period not exceeding sixty years.

The seven congested and insanitary areas scheduled under the 1897 Act contained in all about 6 acres. The whole of the properties within these areas were acquired, either by agreement or arbitration, within a considerably shorter time than the three years allowed by the Act. The amount which has been paid for these properties, and also for those acquired for the widening of Nelson Street, City, including claims for business disturbance and expenses, may be stated in round numbers at £300,000.

The areas scheduled under the 1897 Act have been, or are in course of being, reconstructed, and this part of the work authorised under the Act will be finished in the course of another year. The various stages at which the improvements are in the respective areas may be now given—

Area I. is situated on the west side of High Street, north of George Street. Buildings have been erected covering the whole area. These consist of dwelling-houses and shops, with three blocks of workshops on the back ground. The cost of the buildings amounted to £36,050.

Area II. is situated on the east side of High Street, directly opposite Area I. The character of the new buildings thereon, which are now approaching completion, is similar to that of those erected on the first area, consisting of dwelling-houses and shops fronting the street, and two one-storey stores on the back ground. The reconstruction of these two areas

has resulted in an improvement of the High Street, by which its width has been increased to 60 feet. The estimated cost of the buildings on the area now referred to is £23,200.

Area III. is Nelson Street improvement, which was contemplated by the Act of 1866, and again included in the Bill of 1897, for the purpose of widening Nelson Street from a 22-feet street, available only for foot passengers, to a 50-feet street for general traffic. The building on the east side of the street has been completed, except the corner block at the junction of Trongate and Nelson Street, which is in course of erection, and is to be completed in spring of 1905. Another building on the south-west corner of Bell Street and Nelson Street, which has been commenced, will complete the reconstruction of this area. The whole of these buildings, from their central situation so close to the Fruit Market and Bazaar, have been designed as shops and warehouses, and are estimated to cost £88,000.

Area IV. abuts on the south side of Trongate, and is bounded by that street and King Street, Osborne Street, and New Wynd. The land in this district is of considerable commercial value, and, like Nelson Street area, the buildings with which it has been covered are entirely for business uses. This action is dictated by the desire to recover for the ratepayers some portion of the heavy cost of the improvements effected, and is quite within the discretionary powers given to the Corporation by the 1897 Act. Parnie Street has been driven westward through the centre of the area, separating it into a north and south block. The extension of Parnie Street involved the dedication of 622 yards of ground to additional street surface, at a cost of £7,872. The north block, which was finished two years ago, cost £25,000, while the south block, which was finished within the present year, is estimated to cost £24,500.

It may be mentioned that the plans for the reconstruction of the whole of the four areas before referred to were from competitive designs invited from outside architects of well-known ability, and were selected by the Trustees after mature consideration and under the advice of their Manager and other competent experts.

Area V. is on the west side of Saltmarket, and is bounded by that street, Jail Square, St. Margaret's Place, and Bridgegate. It is to be covered by tenements of houses, with shops in the street flat, at an estimated cost of £17,550. The houses in the tenements fronting on Bridgegate and St. Margaret's Place are to be let at cheap rents, and reserved for the poorest classes. 1,080 square yards of ground in this area are to be appropriated to the widening of Bridgegate and St. Margaret's Place. The reconstruction work was commenced in the beginning of the present year (1904).

Area VI., covering the block bounded by Stockwell Street, Bridgegate, Aird's Lane, and Goosedubbs, is to be rebuilt with buildings similar to those described for Area V., at an estimated cost of £18,000. The ground is at present being cleared of the old properties.

South-Side Area, situated south of the River Clyde, between St. Ninian Street and Muirhead Street, is in course of reconstruction with buildings of the same description as those designed for the two last-mentioned areas. These buildings are to be ready for occupation by the close of

the present year, and are estimated to cost £12,510. The plans for the reconstruction of these three areas have been prepared in the office, and the buildings are being erected under the supervision of the City Engineer.

In the exercise of the powers given to them by Section 12 of the 1897 Act, the Trustees acquired, within two years of the passing of the Act, at very moderate prices, close upon 25 acres of vacant ground for the erection thereon of dwellings for the poorest classes. The whole of the ground purchased was surplus land in the hands of other departments of the Corporation. The largest portion of the ground so acquired is situated upon the fringes of the Alexandra and Springburn Parks, in the northern quarter of the city, while the remaining portions are located in Baltic Street and Haghill, in the eastern district of the city.

The covering of the ground at Haghill and Baltic Street with houses suitable for the poorest classes, from plans furnished by an outside architect, was completed by the spring of 1902. The two blocks of four-storey tenements are almost identical in design, and contain 112 one-apartment houses and 145 two-apartment houses. The rents of these houses average £5 per annum for a one-apartment house, and £8 per annum for a two-apartment house, exclusive of taxes. There is a great demand for these houses, and applicants are not accepted as tenants for the single-apartment houses whose weekly earnings average above 22s., nor for the two-apartment houses in receipt of more than 26s. per week. Where, however, the applicant has a family of over three children, consideration is given to the larger expense of maintaining such a family, and the rule is to a slight extent relaxed. A caretaker is resident in each block, who is responsible for the good order of the tenants and the prevention of overcrowding. The cost of these two blocks is as under-noted, thus:—

Haghill Tenements.

Site,	£1,503	12	0	
Buildings,	15,798	2	4	
	<hr/>			£17,301 14 4

Baltic Street Tenements.

Site,	£1,044	2	6	
Buildings,	10,465	8	1	
	<hr/>			11,509 10 7
	<hr/>			£28,811 4 11
	<hr/>			

It may be of interest to the members of the Congress to have a statement of the annual income and expenditure of one of these blocks.

I therefore append a note of rental and outlays on Haghill labourers' dwellings for the year 1902:—

STATEMENT OF RETURN FROM HAGHILL LABOURERS' DWELLINGS
FOR YEAR ENDED 31ST MAY, 1902.

	Rental.	Outlays.	Percentage of Rental.
Year 1901-1902,	£1,099 3 0		
Outlays—			
Management, ... ..	...	£44 17 1	4·08
Repairs, ... ..	...	79 15 9	7·25
Rates and Taxes, £320 7 11			
Less recovered from Tenants, 187 14 9			
		132 13 2	12·07
Insurance, ... ..	...	7 13 6	·71
Miscellaneous, ... ..	...	6 16 1	·61
Caretaker (wages and house rent)	...	33 9 3	3·04
Irrecoverable Arrears, ..	...	5 8 8	·49
Sinking Fund, ... ..	...	288 6 8	26·24
Interest on £17,000 at £3 ls. 6d. per cent., ... ..	...	522 15 0	47·57
			73·81
Deficiency,	22 12 2	...	2·06
	£1,121 15 2	£1,121 15 2	100·00

It will be noted that the charges for sinking fund and interest absorb 73·81 per centum of the gross rental for the year, and that the ordinary outgoings represent 28·25 per centum of said rental. It should also be observed that the annual charge for sinking fund is £288 6s. 8d. As this fund accumulates the interest payable will be correspondingly lessened, and in the course of three or four years the deficiency will disappear.

After the completion of these two blocks in 1902, it was found that under the "Building Regulations Act, 1900," a large number of houses in the city were liable to be closed at the instance of the Master of Works as not having free space opposite the room windows sufficient to meet the statutory requirements. At the same time the Health Department—continuing to apply for Closing Orders under the 32nd Section of the "Glasgow Police Amendment Act, 1880," against uninhabitable houses—began to use their powers under the Housing of the Working Classes Act (Part 2) for the demolition of obstructive buildings, a large number of these being "back lands" occupied by the poorest classes, and situated in densely populated sections of the city. The dwellers in these "back lands" are not likely to migrate to new houses such as were proposed to be built on the ground acquired under Section 12 of the Act of 1897 on the fringes of the public parks. The problem that appealed to the

Improvements Committee was that of finding cheap ground in the neighbourhood of these congested areas for housing the dispossessed population. Great difficulty has been experienced in the efforts to secure ground in the localities marked out by the necessities of the case at a price low enough to admit of the cheapest class of dwellings being erected and maintained on the basis of yielding, within a few years of their erection, a return that will make them self-sustaining—that is, place them financially on the same footing as Haghill and Baltic Street, as shown by the annual return given above. It is still hoped that some suitable sites may be found at a price that will not be prohibitive of purchase in the near future.

It is believed that what has been set down in the foregoing pages will convey, in some measure at least, an idea of the scope and value of the great work which has been accomplished by the City Improvement Trustees within the sphere of their past labours. So far as the central portions of the city are concerned, especially in the region of the Glasgow Cross and the historic Saltmarket, very little now remains of old Glasgow as it existed prior to 1866. Indeed, so great have been the changes effected by the operations of the Trustees in this locality, that if the shade of Bailie Nicol Jarvie were to revisit it, he would fail to find any of the ancient land marks, except perhaps the steeples of the Tolbooth and the Tron Church and the statue of King William, and, as for the latter, he would be puzzled to know why the equestrian was now facing to the west.

Although, however, the operations already carried out by the Trustees under the Acts of 1866 and 1897, and those still to be completed under the last-mentioned Act, have been, and will be, productive of great sanitary and hygienic advantages to the whole community, there are still a few "dark spots" within certain districts of the city requiring to be cleared and reconstituted. This work—however it may be carried out—and the provision of healthy houses, where citizens whose wages are not beyond the subsistence line may be able to live under proper hygienic conditions within a reasonable distance of their daily work, remain as a heritage, which the city fathers are pledged to enter upon and carry on in the future, as the same or like problems have been dealt with by their predecessors in the past.

PUBLIC HEALTH.

(a) MEDICAL OFFICER OF HEALTH.

HOSPITALS AND RECEPTION-HOUSES.

THE development of sanitary administration in Glasgow has been written in the statistical divisions which for fully thirty years formed the units of administrative effort for public health purposes. Recently, however, a change has been made, and the municipal wards have been substituted, because the extensive changes which the past thirty years witnessed had deprived the older divisions of much of the importance which formerly belonged to them.

The older areas took their origin in sub-divisions of the civil registration districts; the newer areas may claim to reflect more accurately the local interest in self-government which the municipal conscience of to-day expects of its citizens.

The change in the death-rate which the older areas witnessed is graphically represented in the following diagram, where the solid colour represents the death-rate of each district as it was in 1899-1901, and the shaded extension upwards indicates the death-rate of the same district in 1871-2:—

The general death-rate for several periods has been—

	1881-1890.	1891-1900.	1903.
General death-rate, ...	24·2	21·5	18·5
Principal zymotic diseases, ...	3·6	3·3	2·5
Phthisis, ...	2·7	2·1	1·6
Diseases of respiration, ...	5·9	5·0	3·9
Infantile death-rate, ...	147	149	142

Closely associated with this reduction in the death-rate has been the expansion of hospital provision by the municipality for the treatment of infectious diseases. This is now mainly provided in the hospitals at Belvidere and Ruchill, to which will shortly be added one for the treatment of smallpox at Robroyston. The present smallpox hospital is situated on the estate of Belvidere, but, as will afterwards be seen, it is administratively distinct from the fever hospital. There is also auxiliary accommodation amounting to 200 beds still available in Parliamentary Road Hospital, which was the original municipal fever hospital of the city.

The permanent hospital provision presently existing may thus be stated—

Belvidere—Fever Hospital, ...	390 beds.
„ Smallpox (Brick Wards), ...	150 „
„ 5 Wooden Pavilions, ...	85* „
	<hr/> 625 beds.
Ruchill—Fever Hospital, ...	440 „
	<hr/> 1,065 beds.

which is equal to 1·3 beds per 1,000 of the population, or 1·6 per 1,000 when the auxiliary beds at Parliamentary Road are included.

The proportion of beds available for the treatment of infectious

* These were added early in 1901 to meet an increasing prevalence of smallpox.

diseases per thousand of the population at several periods since 1865 has been—

Year.	Parish.			Glasgow Royal Infirmary.	Local Authority.*				Total Beds.	Population in Thousands.	Beds per Thousand.
	City.	Barony.	Govan.		Parliamentary Road.	Belvidere Fever.	Belvidere Smallpox.	Rachill.			
1865	100	120	54	200	136	...	...	...	610	428	1.4
1866	100	120	54	175	136	...	...	...	585	438	1.3
1867	...	120	54	100	136	...	...	...	410	446	0.9
1869	...	120	54	135	136	...	...	...	445	464	1.0
1870	...	120	54	100	250	250	...	...	774	471	1.7
1872	...	120	...	100	250	250	...	...	720	495	1.4
1875	100	250	250	...	...	600	500	1.2
1876	250	250	...	...	500	502	1.0
1878	120	250	150	...	520	507	1.0
1880	120	250	150	...	520	510	1.0
1881	120	370	150	...	640	512	1.2
1882	120	220	150	...	490	518	1.0
1887	120	390	150	...	660	545	1.2
1893	200	390	150	...	740	644	1.1
1900	200	390	150	440	1,180	755	1.6
1901	200	390	235	440	1,265	798	1.6

* For the number of beds which it is intended to provide at Robroyston Small-pox Hospital see page 57.

The bed accommodation in all the hospitals is calculated on an allowance of 2,000 cubic feet for adults, but, as the majority of patients are children, a larger number can be accommodated than is indicated above.

The number of beds required for the treatment of epidemic diseases depends to a large extent on local custom. All authorities are agreed that the major infectious diseases—typhus fever, smallpox, enteric fever, &c.—should at least be provided for, and the proportion of beds required for this purpose is usually stated at one per thousand of the population. In Glasgow a large number of cases of whooping-cough and measles are also treated in these hospitals, and, apart from this, the increasing use now made of the hospitals by all classes of the population in times of infectious sickness places the proportion just stated much below the requirement for industrial populations.

During the past thirteen years the proportion of cases of enteric fever and scarlet fever treated in hospital has been—

Year.			Scarlet Fever.		Enteric Fever.
1891,	...	...	62·8	...	59·8
1892,	...	...	62·7	...	58·3
1893,	...	...	70·9	...	60·9
1894,	...	...	73·7	...	72·2
1895,	...	...	75·5	...	74·5
1896,	...	...	78·9	...	71·1
1897,	...	...	75·3	...	74·6
1898,	...	...	82·3	...	86·6
1899,	...	...	83·8	...	89·4
1900,	...	...	85·7	...	85·1
1901,	...	...	84·3	...	85·1
1902,	...	...	85·3	...	90·7
1903,	...	...	84·9	...	92·3

On the annexation in 1891 of the burghs of Hillhead and Maryhill, Glasgow acquired the share which these burghs formerly possessed in the joint-hospital, Knightswood, but by mutual agreement this was transferred at Whitsunday, 1904, to the remaining burgh of the original combination—viz., Partick—on a payment of £8,181 16s. 8d. The number of Glasgow patients treated therein during each of the years following annexation was as follows:—

1892,	...	...	83	1898,	...	...	130
1893,	...	...	137	1899,	...	...	282
1894,	...	...	108	1900,	...	...	372
1895,	...	...	224	1901,	...	...	253
1896,	...	...	111	1902,	...	...	274
1897,	...	...	108	1903,	...	...	—

Arrangement of Wards.

Allowing for variation in the contour of the various sites, the disposition of the wards in the various hospitals is on a fairly uniform plan. They are distributed in pairs, each pair forming a pavilion one storey in height, and running north and south. Each pavilion is isolated from its fellows, and within the pavilions the wards are completely separated from each other, so that, should occasion arise, different diseases can be accommodated in each ward.

BELVIDERE.

The site on which Belvidere stands extends to 32 acres, and was purchased for £17,000, converted to a ground annual of £680.

It was first occupied for hospital purposes under circumstances of epidemic pressure. In 1870 an epidemic of relapsing fever overtook the city, and the accommodation then existing at Parliamentary Road Hospital became rapidly exhausted. This hospital—the first municipal fever hospital in Glasgow—had been erected and opened in 1865, in presence of an advancing epidemic of typhus fever, to supplement the accommodation then existing for infectious diseases in the wards of the Royal Infirmary and of the various poor law hospitals.

CITY OF GLASGOW HOSPITALS, BELVIDERE.

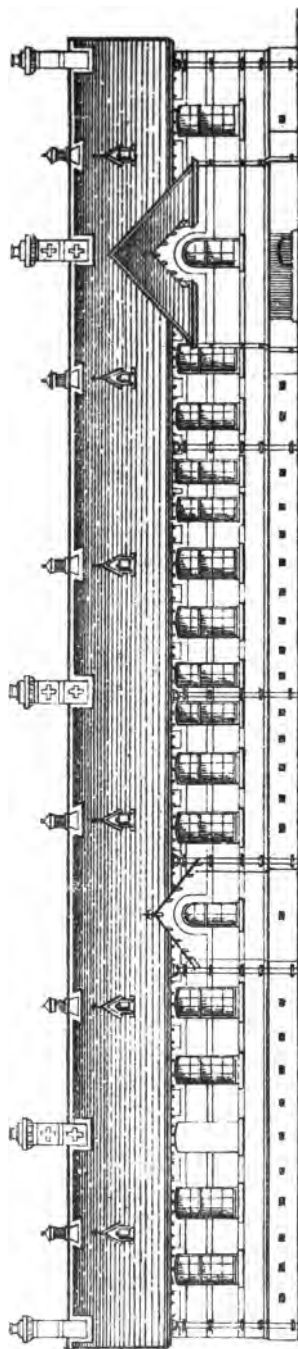
BLOCK PLAN.



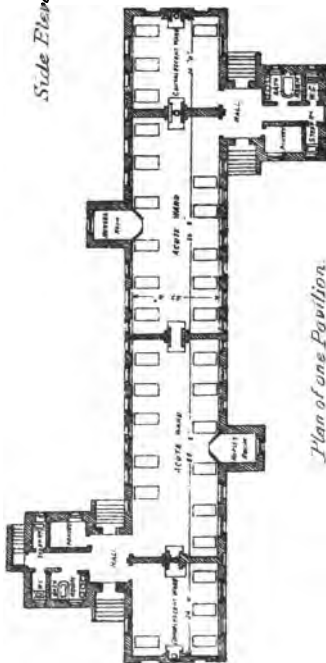
SCALE.
100 200 300 400 FEET

W. J. J. J.
Office of Public Works
Glasgow, June, 1889.

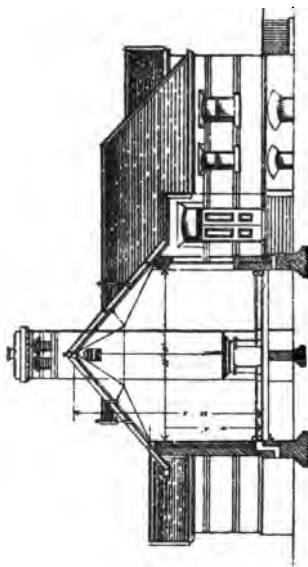
CITY OF GLASGOW HOSPITALS, BELVIDERE.



Side Elevation.



Plan of one Pavilion.



Cross Section.



McLennan.
Office of Public Works,
Glasgow, June, 1888.

On erection, Parliamentary Road Hospital contained 136 beds, but an increase of typhus fever in 1869 necessitated its extension to 250 beds. When this accommodation became exhausted in 1870, the estate of Belvidere was acquired, and, within three months of its purchase being completed, temporary wooden huts were erected, giving accommodation for 366 beds, while the administrative departments were housed in the old mansion-house of the estate.

These wooden huts were in time replaced by brick pavilions, but the completion of the change was only accomplished in 1887. The capital expenditure in connection with Belvidere Fever Hospital is placed at £90,000,* but a considerable portion of this must be placed against the temporary erections, which are now completely demolished.

The first permanent buildings erected on the grounds were set aside for the treatment of smallpox, 150 beds being provided in five pavilions. These buildings were begun in 1874, and completed in 1877. A separate administrative block, kitchen, laundry, and other offices are provided, so that, although occupying a portion of the same site, the smallpox hospital is administratively quite distinct from the fever hospital.

The following is a description of the wards which were the last to be completed at Belvidere, and it is generally applicable to all the pavilions, allowing for difference in certain details which the experience acquired in working those which were first completed showed to be desirable.

The outside length of each pavilion from end to end is 168 feet; the outside breadth, 26 feet; the height, from ground level to ridge of roof, 32 feet. There are four wards in each pavilion, divided into two convalescent and two acute wards. A flight of steps on both sides gives access to a vestibule, from which, on one hand, are the entrances to these sub-divisions, while, on the opposite side, is the pantry, opening directly off the passage, and a lobby, to the left of which are the bath-room and water-closet, and to the right a steep-room for soiled linen—these last being farthest from the wards. All these appurtenances are, therefore, completely isolated in a projecting annexe. The entrance and annexe of each ward are on opposite sides of the pavilion. On the side opposite to the entrance of the acute ward is a nurse's duty-room, where there is a "poison press" and napery press, with chairs and table. The front projects into the ward with sloping roof and glass sides, giving a full view of the acute ward. The internal dimensions are as follows:—Acute ward—length, 56 feet 3 inches; convalescent ward—length, 24 feet. In both the breadth is 22 feet; the height to the wall head, 14 feet 6 inches; to the roof tree, 23 feet 9 inches. The floorage of the acute ward is 1,237 square feet; of the convalescent, 528 square feet. The total cubic contents of the acute ward are 23,300 cubic feet; of the convalescent ward, 10,000. The number of adults' beds is 11 for the acute and 5 for the convalescent ward, but in the case of children 20 cribs are allowed.

All the flooring of the wards is of Dantzic oak, waxed. The vestibule and annexe are laid with tiles. The walls are coated with Keene's

* This does not include the cost of erecting the wooden huts in the smallpox hospital in 1901, which may be stated at £6,074 17s. 6d.

‘cement. Some wards are oil painted and varnished, but the more recent are treated with light blue or green distemper, which can frequently be renewed. All the wood work is varnished. Care is taken to avoid flat surfaces giving lodgment for dust. The principal rafters are, therefore, of light iron, and the ties of thin rod iron.

The heating is by hot water circulating in pipes which are led round the walls above the floor. This is derived from two hot-water tanks, heated by steam, and placed beneath the entrance hall of each ward, to which access is obtained from the outside by a stair leading to the basement. There are also open fires at either end of each ward. Pavilions, with numerous windows, and open to the roof, are very difficult to warm sufficiently during winter. Experience at Parliamentary Road soon showed that it would be necessary to check radiation by the large glass area, and, accordingly, the device of double glazing each pane, with an interval of three-quarters of an inch of air space, was adopted. The wards at Belvidere are kept at 55 degrees to 60 degrees in the coldest weather. There are heating coils in the vestibule and bath-room.

Fresh air is admitted by direct openings beneath the windows, which are numerous, so that it passes over the heating pipes. These openings are controlled by an arrangement which admits of gradation, and cannot be interfered with except by the nurse. There are skylights on opposite sides of the slope of the roof, Boyle’s ventilators fixed on the ridge, and ventilating shafts alongside the chimneys, with openings, controlled by movable louvres, at the apex of the roof.

The principles kept in view in furnishing are simplicity, smooth surfaces, and facility of removal and cleaning. The bedsteads are wrought iron, the tables and chairs hardwood varnished. In children’s wards iron cribs are provided, and pigmy forms and tables suited to their size. All cupboards, presses, &c., are movable, on iron rollers, like American trunks. The mattresses are stuffed with straw, the pillows with chaff. They are renewed for every new patient and whenever soiled.

RUCHILL.

The estate of Ruchill (or Roughill, as the spelling formerly ran) is situated about three miles north-west of the Cross of Glasgow. It was at one time in the possession of the Archbishop of Glasgow, and appears in the rent books of the diocese as forming part of the revenue of the barony.

When the boundaries of the city were extended in 1891, 91 acres of this estate were purchased by the Corporation, 53 acres of which were laid out as a public park, 36½ acres* were set apart for hospital purposes, and 1½ acres utilised for the erection of a washing and disinfecting station.

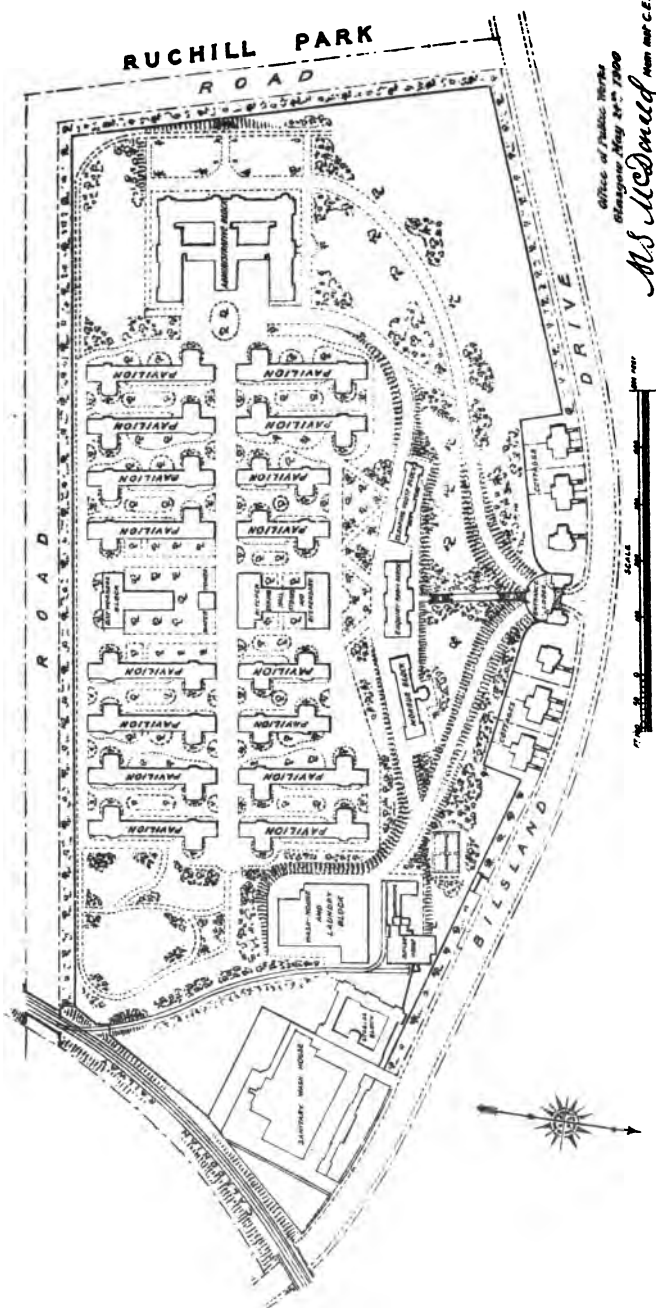
The erection of the hospital was begun on 16th April, 1895, by cutting the first sod for the foundation of the administrative department; the foundation stone was laid by the wife of the Lord Provost of the time (now Sir James Bell, Bart.) on 29th August, 1895; and the hospital formally declared open on 13th June, 1900, by H.R.H. Princess Christian.

* In 1892-3 additional acres were purchased to the east of the hospital site, £4,023 15s.

CORPORATION OF THE CITY OF GLASGOW.

PLAN

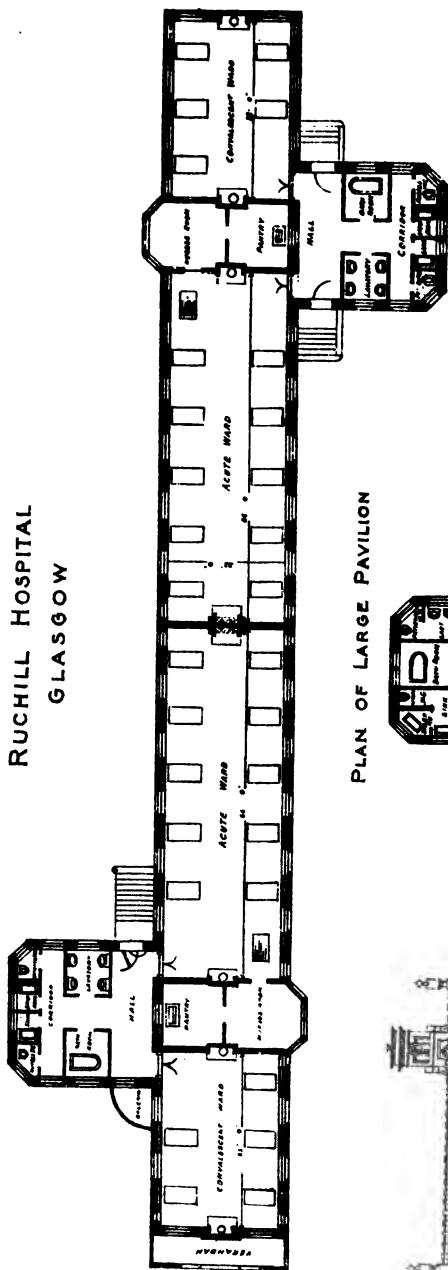
**SHOWING THE GENERAL ARRANGEMENTS OF
RUCHILL HOSPITAL.**



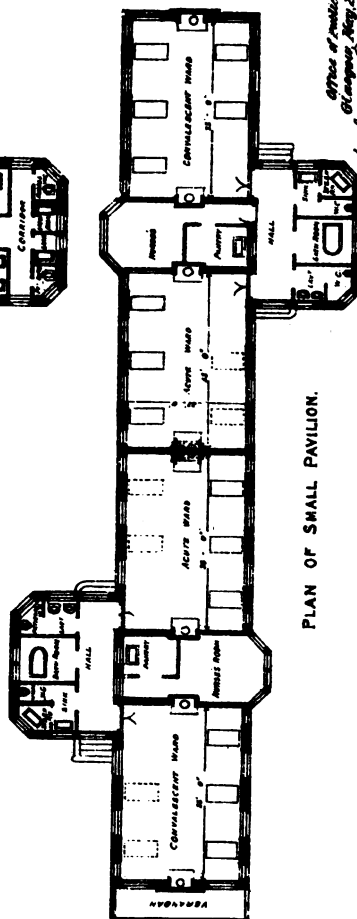
Office of Public Works
Glasgow, May 24th 1900
Ms. McDonald
City Engineer



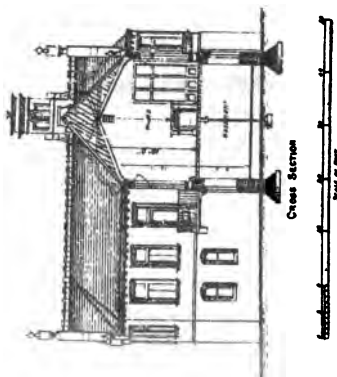
RUCHILL HOSPITAL GLASGOW



PLAN OF LARGE PAVILION



PLAN OF SMALL PAVILION.



Office of Public Works
Glasgow, Aug. 24-1900
Mrs. McDonald
Arch. Engr.

Patients were first admitted to the wards on 10th September, 1900.

The hospital site is on sloping ground, the main declivity of which is toward the north-east, but along this main slope, on either side, the contour is irregular, so that a considerable extent of underbuilding has been required to preserve a fairly uniform level for the floors of the various walls.

The only entrance to the hospital is by the main gateway in Bilsland Drive.

The general disposition of the buildings is as follows:—The administrative block, facing west, occupies the higher part of the ground, and extending eastwards from its rear is a main street or avenue, along both sides of which the pavilions and other executive buildings are arranged.

Midway along the main avenue, on the south side, is a water tower, 165 feet in height, rendered necessary by the elevation of the ground on which the hospital stands, but dealt with architecturally in a manner which makes it a feature in the landscape. Round this tower the several buildings may be said to be grouped. To the north of the tower, and on the opposite side of the avenue, is the kitchen and stores block, containing dining-halls, dispensary, offices for the clerk of works and house steward, and store-rooms for the matron. On the south of the tower is the day workers' or cleaners' block, containing 78 bed rooms.

The administrative block is three storeys in height. It has a frontage of 240 feet, with wings on either side extending to 189 feet, and provides accommodation for the administrative staff and 200 nurses. The wards are arranged in 16 pavilions of two wards each, the pavilions being separated from each other laterally by an interval of 70 feet. Four of the pavilions are smaller than the others, in order to provide facilities for the isolation of cases of mixed infections. The larger pavilions have an over-all measurement of 231 feet 1 inch by 25 feet 7 inches. Internally the wards are divided by a mean gable. Each ward contains an acute and convalescent section, the acute measuring 66 feet by 22 feet, and the convalescent 33 feet by 22 feet, giving a floor space of 145 square feet per patient. The wall head is 13 feet high, and the apex of the arch of ceiling 18 feet. The flooring is of pitch pine, stained and polished; the walls lined with decorative tiles to the height of 7 feet. The upper part of the wall above tiles, and the ceiling, which is arched, are plastered with Keene's cement, and washes with distemper. These measurements apply to the larger pavilions.

The smaller pavilions measure 165 feet externally, and are divided and arranged on the same general plan as the larger pavilions, except that here the acute ward is of the same size as the convalescent ward, and each provides for five patients.

The internal arrangements of the wards differ somewhat from those at Belvidere, especially in the position of the nurse's room and pantry, which are placed between the acute and convalescent wards, while the lavatory, bath-room, sink, steep-room, and water-closet for nurses and patients are in the annexe, which is separated from the ward by an entrance hall.

The heating of wards is by means of hot water, heated by steam from a boiler placed in the workshops block, the steam being led into

cylinders placed in the basement of each pavilion, from which a system of hot-water pipes is led round the ward.

The wards are lit by electricity, movable hand lamps being arranged along the walls between the beds.

Fresh air is admitted by openings in the walls, 14 inches by 8 inches in size, placed below and between the windows, so that the air enters immediately behind the hot-water pipes. The escape of foul air is provided for by roof-ridge ventilators, and the windows are arranged for auxiliary ventilation.

Fireplaces exist at both ends of each ward, and round the smoke-stalk a channel is left which draws the air from the wards near the ceiling.

A special feature is the provision of a verandah at the south gable of each pavilion, in order that convalescent patients may have an opportunity of sunning themselves without the exhaustion of walking.

Three separate buildings form a group between the entrance gate and the kitchen block, and provide an enquiry room for friends and an office for the registrar in the centre, a clearing-house block for scarlet fever patients on the right, and a laboratory and mortuary block on the left. The laboratory is octagonal in shape, is situated on the north side of the mortuary block, and fitted with the most recent appliances for pathological and bacteriological investigations.

Hair mattresses have here been substituted for straw, and, with the provision of a steam disinfecter, the greater original cost is likely to be recouped by their greater durability.

The total cost of the hospital and furnishing included, when completed, will be close upon £300,000, including site.

SMALLPOX HOSPITAL, ROBROYSTON.

The estate of Robroyston is situated to the north-east of Glasgow, and is four miles distant from the centre of the city. The area set apart for hospital purposes extends to 153½ acres, and is bounded on the north and west by the road leading past Hillend and Robroyston Mains to Lenzie, on the south by a parish road running eastward from a point to the south of Robroyston Cottage, and on the east by a road connecting this road with that first mentioned, and passing Auchinleck Farm-house.

The outer zone of this area will not be protected against access from the roadways, save by the presently existing fences, but all the hospital buildings, including the bacteria beds for the treatment of sewage, will be surrounded by an outer closed palisade at least 6½ feet in height, and enclosing 57 acres. There will also be an inner palisade, distant at most parts 70 feet from the outer one, and enclosing only the wards for the treatment of patients, and containing 18½ acres. The distance between any ward, save that used for the isolation of mixed infection or cases admitted through error in diagnosis, and the nearest point of the outer palisade, will not be less than 130 feet.

A space of 750 feet will separate the wards from the nearest public road. The mortuary will be about 380 feet therefrom.

Wards.

(a) *Orientation.*—The number of wards at present to be erected is ten, which will accommodate 190 adults at 2,000 cubic feet for each. The main direction of each pavilion is south-west. The engineers had before them the desirability of complying with the suggestions regarding the orientation of hospital wards which are contained in the fifth annual report of the Local Government Board, but were compelled, owing to the rapidly attiring levels and the desire to avoid much underbuilding, to adopt the direction shown on the plan, which is approximately south-west by west.

The plans show that the wards presently to be erected consist of two rows of five wards in each, the lateral separation of the wards being 100 feet, and between the adjoining gables 50 feet. Each pavilion represents a separate ward, consisting of an acute and a convalescent section, the proportion of beds being ten acute to eight convalescent. Access is obtained through a cut-off porch at the side and opposite one end of the partition separating the acute from the convalescent section. The porch also gives access to an annexe in which are situated the ward kitchen, bath-room and lavatory, two water-closets, a housemaid's sink, and steep-sink. A nurse's or duty room projects from the wall opposite the annexe, at the further limit of the partition separating the acute from the convalescent ward.

Isolation Ward.—In addition there is an isolation pavilion of 12 beds, separated into two sections of two rooms each, the rooms containing 4 and 2 beds respectively. The total bed accommodation is thus 372. This number represents an average of 2·4 beds per acre over the total acreage; but 6·5 per acre within the outer palisade.

The isolation block is shown on the southern flank of the wards, but, from the adaptability of its design and internal arrangements to the supply of separate accommodation for both sexes under one roof and in charge of one staff, the internal arrangements of the ward may be repeated in one or more of those in the front row in order to meet the restricted demands on bed accommodation which occur in the years between epidemic prevalences of smallpox.

(b) *Internal Measurements.*—The internal measurements of the pavilion are as follows:—

Acute Ward—

Length,	70 feet.
Width,	26 "
Height to ceiling,	14 "
Height to ridge,	22 "
Number of windows,	10.
Size of window, extending to wall head, ...	10 feet by 4 feet.
Total window area,	400 square feet.
Total floor area,	1,820 "
Cubic space per bed,	2,500 cubic feet.
Relation between window space and floor area,	1 foot to 4½ feet.
Relation between window space and cubic space,	1 " 63 "
Space between beds, from centre to centre, ...	14 feet.
Floor area per bed,	182 square feet.

Convalescent Ward.—The cubic space per bed, and the relations between window and floor and cubic space, are similar to the above.

(c) *Structure and Ventilation of Wards.*—It is intended that the structure of the wards will be of a composite character, the superstructure being of wood or other temporary material resting on brick walls. There will be an average interval of four feet between the floor level and the ground, and this space will be freely ventilated. The framework of the walls will be of wooden standards, lined on both sides with wood, but it is under consideration whether the inner lining should not be of fibrous plaster. The plans show a ceiling, and ventilation is provided by five Boyle's ventilators on the ridge. From the experience of continuous ridge ventilation which we have obtained in the wooden pavilions erected at the smallpox hospital at Belvidere in the emergency of 1901, most satisfactory results (judged roughly by the simple test of smell) have been obtained, and an adaptation of this is being considered.

(d) *Heating.*—It has been decided to introduce the Reck system of heating. Two fireplaces, with brick chimneys, will also be provided in each ward.

Nurses' Clearing-house.—An endeavour has been here made to accomplish the disinfection of nurses before going on leave. Some disadvantage has arisen in the past through the nurses having both their out-door and in-door garments within the compass of a small room; and in the nurses' clearing-house now proposed, and situated near the gate, a series of baths has been provided in the central section of the building, and sets of undressing and re-dressing rooms at either end.

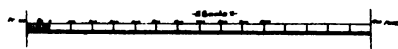
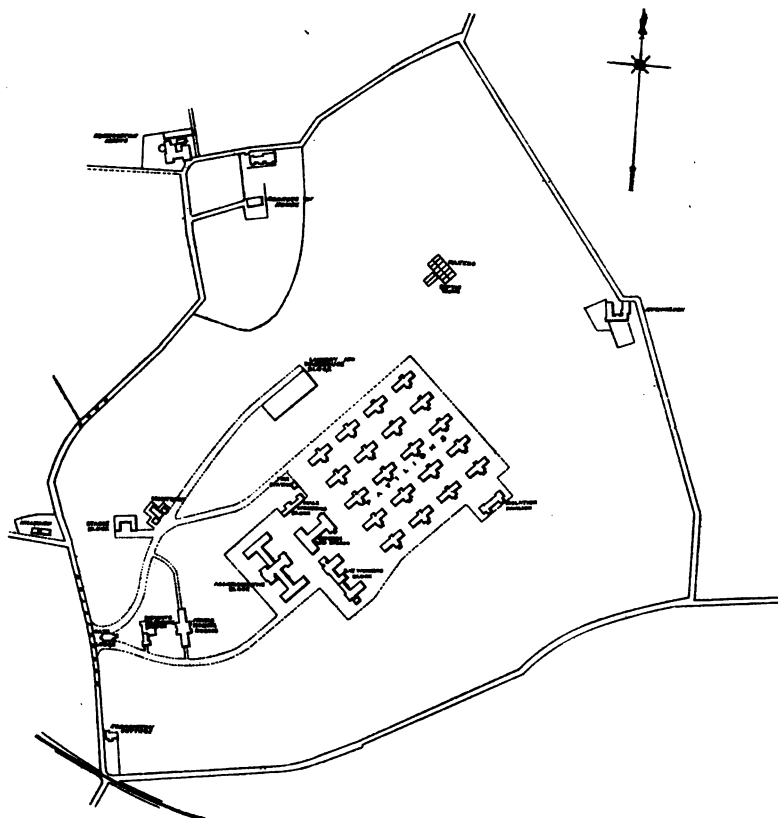
In all, there are 8 bath-rooms, with 11 dressing-rooms or bays on either side, and at opposite ends of the building. In each undressing room on the infected side there are six lockers, in which the nurse may leave her ward clothing, and, in a bath gown provided by an attendant, proceed to the bath-room. Beyond the bath she enters one of 11 sets of rooms similar in structure to those on the infected side, but containing her out-door clothing.

In the waiting-room of this side, boxes may be kept, so that, as far as may be, the nurse leaves the hospital in clothing which has never been beyond the clearing-house.

Two wash-hand basins and water-closets are provided in the central portion of the block.

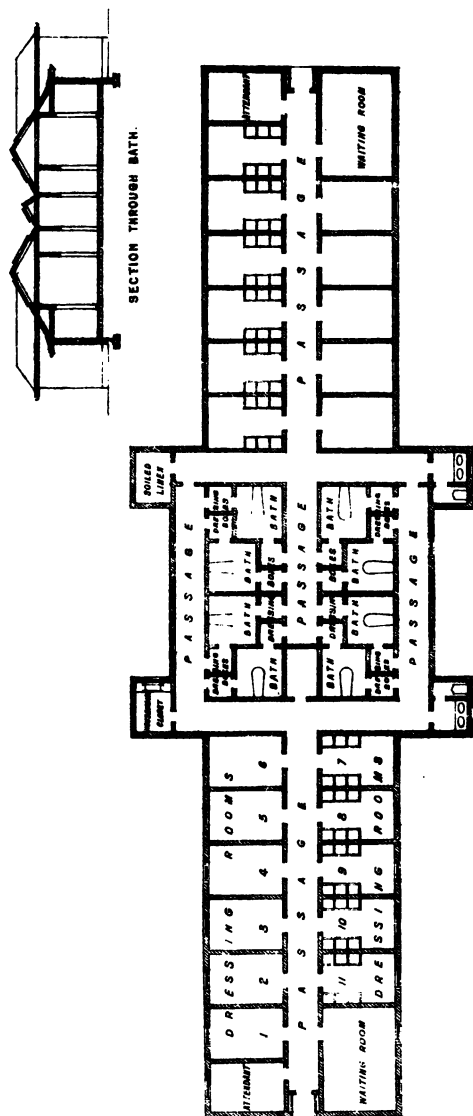
Administrative Block.—This is a two-storey block, and contains—(1) Accommodation for the resident medical staff, consisting of sitting-room, business-room, 6 bed-rooms, and lavatory suite; (2) accommodation for matron, consisting of bed-room, sitting-room, business-room, and lavatory suite; (3) nurses' accommodation, consisting of 58 bed-rooms for nurses, measuring 14 feet by 9 feet by 11 feet (this latter might be 10 feet), 1 bed-room for each nurse, 2 sitting-rooms, and a recreation hall. This represents accommodation only for a staff for the 10 wards, and it is arranged that this may be doubled on occasion. Six water-closets are provided here, representing roughly 1 to 10, and a similar number of bath-rooms.

CHARLES HOSPITAL
AT
ROBERTSON
BLOCK PLAN



Office of Public
 Works of Los Angeles

NURSES CLEARING BLOCK.



A vertical scale bar labeled "SCALE" with markings from 0 to 50 feet. The scale is oriented vertically with 0 at the bottom and 50 at the top. Major markings are at 0, 10, 20, 30, 40, and 50 feet. The text "50 Feet" is written at the top right of the scale.

M. S. McDonald.
Office of Public Works,
Hansgang, Dec. 1903

NURSES CLEARING BLOCK.



M.S. McDonald
Office of Public Works,
Flagstaff, Dec. 1903

Cleaners' Block.—This is also a two-storey building, and consists of—(a) 39 bed-rooms for cleaners, and a recreation hall and a scullery; (b) 2 bed-rooms, a sitting-room, and lavatory suite for the cook. The closet and bath-room accommodation is in the same proportion as that already indicated for the nurses.

Male Workers' Block.—This contains provision for 10 bed-rooms and a sitting-room, while the lavatory accommodation consists of one wash-hand basin, bath, and water-closet; also a sitting-room, 1 bed-room, and lavatory suite for the house steward.

Kitchen and Stores Block.—For convenience in the distribution of diets to the wards, the palisade enclosing them will be continued along the sides of the kitchen and stores block until it includes the cart-way shown in the middle portion. In this block stores are provided for food and clothes, and dining-rooms for the nurses and cleaners. This is built on a scale sufficient to provide for the requirements of the complete hospital.

Mortuary Block.—This block contains mortuary, *post-mortem* room, and laboratory. The mortuary is 48 feet by 27 feet by 14 feet, while the *post-mortem* room and the laboratory are each 20 feet by 25 feet.

Laundry and Washing-house Block.—This is situated to the north of the wards, and midway between them and the Robroyston Road. This will be the only building constructed of brick, and it will contain boilers for heating and power. The laundry is shown as divided into two main portions—(1) Sanitary washing-house, to deal with (a) the body clothing worn by patients on admission, and (b) the general washing and disinfecting of clothing from infected houses; and (2) hospital washing-house, to meet the requirements of the wards and the staff combined. Here also the building will be sufficient in size to undertake the work of the hospital when complete; but the apparatus supplied for the present will not exceed one-half the total equipment. A steam disinfecting chamber is provided in a separate block adjoining the washing-house; and this also contains a formalin chamber measuring 12 feet by 12 feet by 10 feet, and a destructor for bedding.

Clearing-house for Patients.—This contains three baths, with dressing and undressing rooms on either side for patients, and there is a store adjoining, where the clothing worn by patients when admitted may be kept.

The Gate Lodge.—This consists of a two-storey building, in which is provided a three-apartment house for the gateman, and offices for the medical superintendent and steward, as well as a public office for the gateman; and on the upper floor two bed-rooms, a sitting-room, and a lavatory suite for clerks.

Treatment of Sewage.—The drainage of the hospital will be dealt with bacteriologically in tanks situated to the north of the hospital buildings, and the effluent will be discharged into a burn which runs eastward to the north of Robroyston Road, and ultimately joins the River Kelvin. In the plan which has been prepared by the engineer two septic tanks are shown, each of the capacity of 45,000 gallons, and eight sets of filter beds, each providing for two bacterial contacts. According to the description en-

grossed on the plan, the capacity of the septic tanks and filters has been calculated on a hospital population of 1,000 persons per day, contributing 60 gallons per head, including rainfall.

The maximum volume provided for before the overflow comes into operation is equal to three times this amount—that is, 180,000 gallons per day, or 7,500 gallons per hour.

When this is exceeded, the first overflow comes into operation, and provision is made in the storm-water beds for dealing with an equivalent amount. But should the flow exceed six times the initial volume, portion will then go direct to the stream through the second overflow.

It is assumed that the filters will deal with three charges per day, and on this basis the relation of filtering area to volume will be—

$$\begin{aligned} 1 \text{ square foot} &= 4.68 \text{ gallons per charge.} \\ &= 14.04 \text{ gallons per day.} \end{aligned}$$

Filtering Beds.

The depth and material here used are as follows:—

Primary Filters—

Lowest Stratum,	1 foot 3 inches thick of	$\frac{3}{4}$ -inch ashes.
Middle	" 2 " 3 " "	$\frac{1}{2}$ " "
Upper	" 1 " 0 " "	$\frac{1}{4}$ " "
Total Depth, 4 feet 6 inches.		

Secondary Filters—

Lowest Stratum,	1 foot 3 inches thick of	$\frac{1}{2}$ -inch ashes.
Middle	" 1 " 0 " "	$\frac{1}{4}$ " "
Upper	" 2 " 3 " "	$\frac{3}{8}$ " "
Total Depth, 4 feet 6 inches.		

TRAINING OF NURSES.

In both Belvidere and Ruchill nurses are trained for the service by lectures and demonstrations in nursing, and by practical work in the wards, under the supervision of experienced nurses. The lectures, which include physiology, anatomy, and the theory of medical nursing, are conducted by the medical superintendents and senior resident assistant physicians, and the demonstrations on ward work and practical details of nursing by the matron.

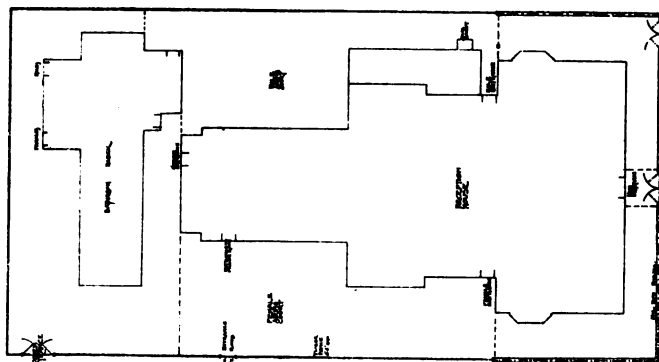
RECEPTION-HOUSES.

The provision of reception-houses for the temporary accommodation of persons who have been in close contact with certain of the infectious diseases is secondary in importance only to the provision of hospital accommodation for the treatment of the infectious sick. In both cases the object is primarily the same—the prevention of the further spread of the disease.

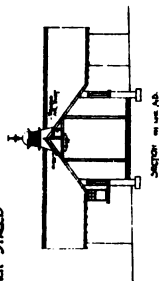
In the case of the patient, he is already infectious, while the contact

RECEPTION HOUSE

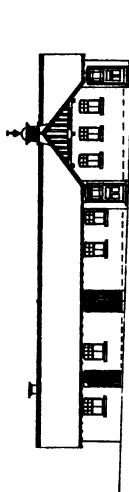
CARRIER OF BARRY
AND BLACK STRIPS



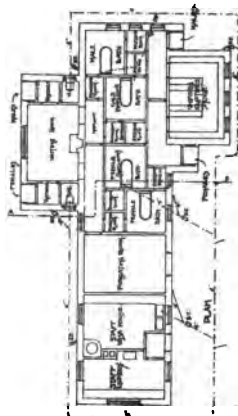
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Workbooks - 2

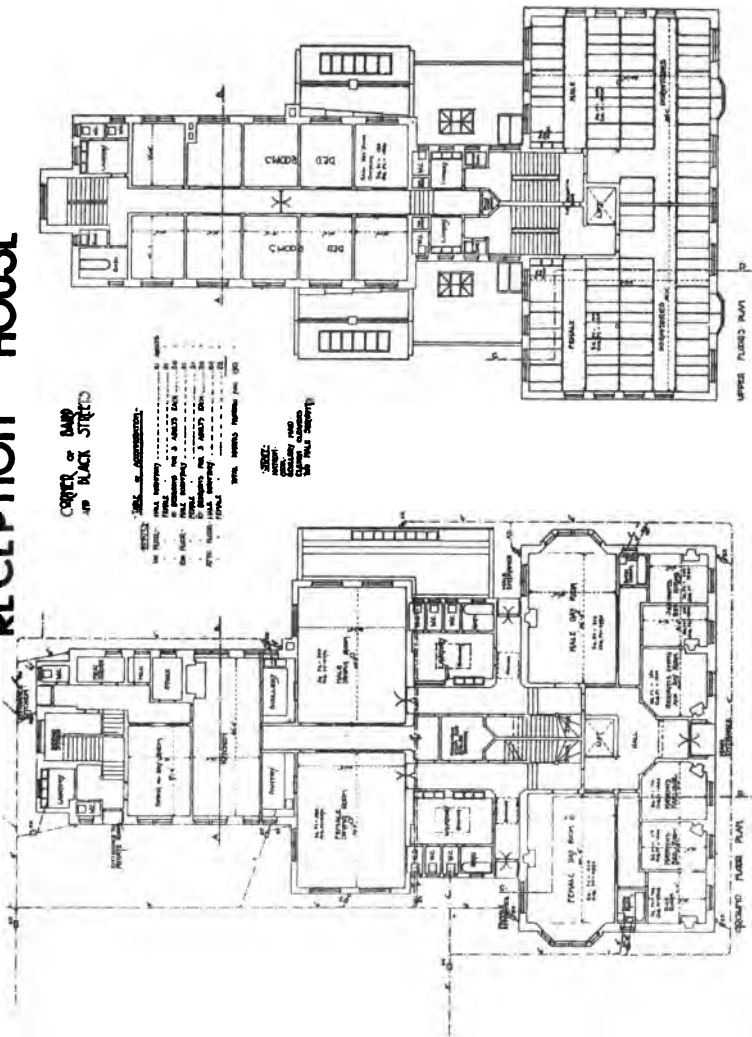


W. B. BENTLEY

OFFICE OF PUBLIC WORKS
GLAYSON

HOUSE

CORNER OF BROAD
AND BLACK STREETS



Scale of 12

11-11-1964

has been exposed to infection and may have contracted the disease, and the time of his residence under observation is determined by the maximum duration of the incubative period of the particular disease with which he has been in contact.

So far back as 1872 permanent provision of this nature was first provided. In 1890 a local Act legalised and made the continuous maintenance thereof compulsory, while the Public Health (Scotland) Act, 1897, enables any Local Authority to make similar provision. Many illustrations of the milder forms of grave infectious diseases—smallpox, for example—are thus detected, which, if occurring among the public generally, would rarely have medical attendance, or have their true character recognised.

The original reception-house was provided by the purchase of a self-contained dwelling in Weaver Street in 1872, and in 1891 further provision was made by the purchase of a similar building in South York Street. Of recent years the building in Weaver Street has proved inadequate, and it has been decided to replace it by a new structure to be erected on a portion of the site presently occupied by Parliamentary Road Hospital.

The number of persons, and the diseases for which they were accommodated in the reception-house during the past four years, has been as follows:—

		Weaver St.		So. York St.		Kennedy St.
Typhus Fever,	...	47	...	41	...	—
Plague,	...	—	...	—	...	—
Smallpox,	...	1,236	...	2,848	...	713
Others.	...	21	...	17	...	1

DESCRIPTION OF PROPOSED RECEPTION-HOUSE AT CORNER OF BAIRD STREET AND BLACK STREET.

The ground on which it is proposed to erect the new reception-house forms the north-east corner of the site of the present hospital at Parliamentary Road. The total area to be devoted to reception-house purposes extends to 1,850 yards, of which 850 will be covered by buildings, the remainder being available as ground for exercise.

The accommodation to be provided will be equal to 189 adults, exclusive of staff, the scale of sleeping accommodation being computed at 400 cubic feet per adult in the bed-rooms, and 500 cubic feet in the dormitories.

As shown on the plan, the accommodation will be of two classes, one section being in dormitories, another in separate bed-rooms.

Most of the dormitory beds will be under a separate roof from the bed-rooms, and it will be possible, through the provision of a staircase in the southern gable of the bed-room or rear portion of the building, and of a double staircase between the two main portions into which the building is divided, to arrange the inmates in three sections, with little save the administration in common. In the plans these are shown as male, female, and bed-room sections, although, in general, it will be

convenient, but especially in times of pressure, to deal with the women and children in bed-rooms, and with men and boys in the dormitories, including that in the attic of the bed-room section, which is only reached by the staircase leading to the dormitories of the front building, called "female" in the plan.

The plans show the following grouping of the beds:—

Dormitory Portion.

Male Section—

Front Building—	First and Second Floor,	21 beds each	=	42	
"	"	Attic Floor, ...	23 "	=	23
					65

Female Section—

Front Building—	First and Second Floor,	22 beds each	=	44	
Back	"	Attic Floor, ...	20 "	=	20
					64

Total Beds,	...	129
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(Entering from same staircase as female dormitories in front building).

Bed-room Portion—

10 bed-rooms on each of First and Second Floors (3 adults per room) in both floors, ...	60
-----------------------------------------------------------------------------------------	----

Total Beds,	...	189
-------------	-----	-----

Bathing Block.—A separate entrance at the side in Black Street is provided for the admission of persons, and this leads to a bath block detached from the rest of the building, and situated at the southern boundary of the ground. There is a common waiting-room, through which entrance is obtained to a separate suite of baths (two in number), and of undressing and dressing rooms for each sex, which again gives access independently to the airing court set apart for each.

Water-closet and Lavatory Accommodation.—In the dormitory section of the building one water-closet is provided in each floor for every twenty inmates. There is a bath-room appertaining to each wing (male and female) in the ground floor, and the lavatories are repeated on each floor. In the bed-room section there is a bath-room for each floor, save the attics, and one water-closet for every five rooms, which may represent fifteen adults.

Ventilation.—The ventilation will be controlled by two electric fans, one for each section, situated in a fan chamber over the central staircase. Each room and dormitory will be connected independently with a central duct leading to the fan of its section. The air will be drawn from each room towards the ceiling, and provision will be made behind the heating pipes for the admission of fresh air.

Access to the kitchen will be obtained through a door by a gateway from Black Street.

A shoot for soiled linen is provided in the central staircase, and ends in the ground floor in a receptacle, from which it will be removed as required.

The accommodation provided for the staff is as follows:—Matron, cook, scullery maid, eleven cleaners, and two male servants—total, 16. It is situated on the ground floor.

INFANT'S MILK DEPOT.

The premises occupied by the Milk Depot are situated at 68 Osborne Street. On the street floor the milk is measured and delivered, while on the floor below this most of the apparatus is placed.

All the milk received at the depot is immediately put through a separator for cleansing purposes, and is remixed as it is discharged from the instrument.

The subsequent treatment will be best followed from a description of the apparatus in use.

Separator.—The separator (an Alfa Laval of 110 gallons capacity) is placed close to the receiving door in King Street, and has been adapted to answer the purpose of a clarifier. After passing through the clarifier the milk is then conveyed in portable tins to the mixing tank, where it is modified according to the age of the infant, and, when this is done, it passes into the receiver of the bottle-filling machine on the basement floor.

On this floor are a number of soak or steep tanks of various sizes, where the empty bottles are dealt with after being returned.

On the front part of the basement floor is an electric-driven bottle washer, the design of Mr. Maxwell Telford, dairy engineer, Glasgow, working six revolving spindles or brushes, so constructed that, without removing the bottle from the spindle, and by a little additional pressure, the bottle is flushed or rinsed by the admission of a spray of clean water.

Filler.—The bottles are then placed on the tray of the automatic filler in rows of twelve. This filler (the Ross-Jones Patent) is capable of filling twelve bottles at one time by simply drawing a lever admitting from a system of vertical syphons the exact quantity required for each bottle. The bottles are then stoppered and put into galvanised-iron baskets, containing nine bottles each, these are placed on galvanised-iron trolleys, shelved so as to accommodate 500 bottles each, which are then conveyed to the steriliser.

The Steriliser is a semi-circular chamber, 6 feet by 4 feet 6 inches by 3 feet 2 inches, placed horizontally on the floor, with a heavy cast-iron door at each end; the body is made of rolled steel boiler plate, $\frac{1}{4}$ inch thick, strengthened on the outside by angle-iron girders, lagged to a depth of $2\frac{1}{2}$ inches with silicated cotton, and covered with polished steel plates $\frac{1}{8}$ inch thick. The steriliser is capable of treating 12,000 7-oz. bottles without baskets and 860 with baskets at one charge.

Two trolleys, containing the bottles after being filled and stoppered, are run into the steriliser, the doors are then firmly closed, and steam carefully admitted until the thermometer rises to 210° Fahr.; at this heat it is allowed to remain for 15 to 20 minutes, when the steam is

turned off and a very fine spray of cold water admitted, reducing the temperature of the bottles before the steriliser is opened. This machine is also the design of Mr. Telford.

The trolleys are then run into a refrigerating chamber, where the temperature is further reduced. After remaining in this chamber from 30 to 40 minutes, they are lifted by a hydraulic lift and placed in the refrigerating chamber on the street floor ready for delivery.

Refrigerating is effected in this case by the condensation and evaporation of carbonic acid gas, the machine being the design of Messrs. West & Co., London.

All the machines on the basement floor are connected by a miniature railway, over which the trolleys pass from place to place.

A vertical boiler of five horse-power, by Messrs Marriot & Graham, Govan, supplies the steam. The basement is ventilated by a 24-inch "Sun" ventilating fan, and lighted throughout by electricity.

The whole of the machinery, &c., has been supplied and erected by Mr. Maxwell Telford, dairy engineer, 338 Pollokshaws Road, Glasgow.

The prices to be charged are as follows:—

For 9 bottles, suitable for the requirements of infants under three months old (one part milk and two parts water), 2d.

For 9 bottles, for infants over three months and under six months (one part milk and one part water), 2½d.

For 9 bottles, for infants over six months and under eight months old, (two parts milk and one part water), 3d.

With a discount of 15 per cent. to dairies purchasing in large quantities.

(b) SANITARY INSPECTOR.

It is fully thirty-four years since the Sanitary Department was constituted. At its inauguration the staff consisted of 1 medical officer, 5 district medical assistants, 1 chief sanitary inspector, 5 district inspectors, 5 lodging-house inspectors, 7 infectious disease inspectors, 18 nuisance inspectors, 5 female inspectors, 1 indoor inspector, 2 clerks, a boy, and a cleaner—total, 51.

The present Sanitary Chambers are situated at the corner of Montrose and Cochrane Streets, a short distance east from the City Chambers in George Square. The view shown is produced from block kindly lent by *Evening Citizen*. They were opened seven years ago, and cost (including the ground and furnishings) about £30,000. They contain accommodation for the Medical Officer, Chief Sanitary Inspector, and Bacteriologist, with their respective staffs. They also, until recently, provided accommodation for the Corporation Chemist, but new premises have now been found for him and his staff at the corner of John Street and Cochrane Street.

In the basement of the Sanitary Chambers are situated the boilers for heating the premises by low-pressure steam, a joiner's workshop, and a specially fitted up fireproof room for preserving registers, books, and other documents. There also are accommodated the whitewashers, disinfectors, and the smoke-testers.

The ground flat comprises rooms for the Chief Sanitary Inspector, his clerks and typists; rooms for the Central District Inspector and assistants, draughtsman, and checkers; vaccination room; public enquiry bar; and rooms for stray patients coming to the office to be examined by the Medical Officer or his assistants.

On the first flat are rooms for the following:—Medical Officer, assistants, and pupils; Medical Officer's clerks; public enquiry bar *re* infectious disease; infectious disease inspectors; and Northern, Eastern, Southern, and Western District Inspectors, with their assistants. There is also on this flat the Medical Officer's library and the Bacteriologist's private room.

On the second flat are the following, viz.:—the food and dairy, night, port, smoke, fish, shop hours, and female inspectors; the clerk of the suburban districts; the Bacteriologist's laboratory, &c.

On the top flat is the caretaker's house, and in the attics are the electric fans for drawing off the vitiated atmosphere from the various apartments in the building.

In the courtyard is the animal house in connection with the experiments of the Bacteriologist.

The office hours are from 9 a.m. to 5 p.m. (1 p.m. on Saturday). The office is open, however, every week-day, all the year round, from 7 a.m. to 7 p.m., certain of the inspectors taking their rotation of a week's duty from 7 a.m. to 9 a.m., and from 5 p.m. to 7 p.m. On Sundays the premises are also open from 9 a.m. to 11 a.m., and from 4 p.m. to 6 p.m. During the time of the smallpox epidemic, and the cases of plague in 1901, the office was open day and night. The inspectors are in the office every morning from 9 to 10 o'clock, and from 4.30 to 5 o'clock in the afternoon. The assistant inspectors are provided with uniform, which is made of dark blue indigo serge, with mohair braiding, and a cap of superfine indigo cloth.

The majority of the staff get a fortnight's holidays during the summer months—so many going every fortnight. Those getting their holidays during the last fortnight of a season are placed at the beginning in the following season, and so on in rotation, going a fortnight later each year. Wages are granted to those on holiday or on sick leave; in the latter case a medical certificate must be sent in.

All persons on joining the sanitary staff must be re-vaccinated, or otherwise must produce a certificate of insusceptibility from the vaccinator of the department.

There is no superannuation scheme in connection with the Sanitary Department, but the Health Committee has during recent years made weekly allowances to certain aged or incapacitated members. When such grants are made, it is stipulated that they are only to continue "during the pleasure of the Corporation," the rate of allowance granted amounting to about a-half of the current pay.

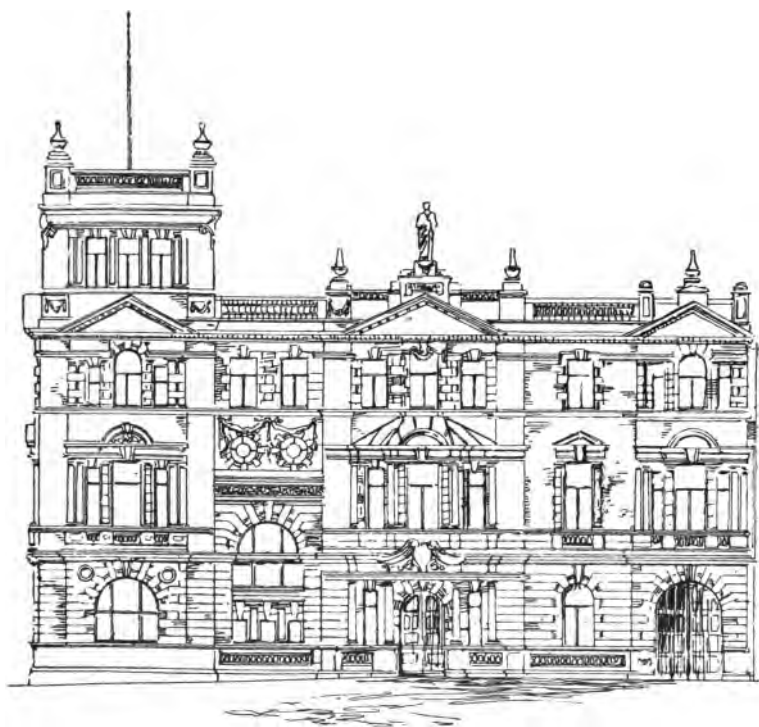
For nuisance, workshop, and drain-testing inspection work, the city is divided into seven districts, viz. :—Central, Northern, Eastern, Southern, Western, North-Western, and South-Suburban, with a district or supervising inspector over each, who has several assistants under him. The inspectors of the North-Western and South-Suburban areas have district offices, viz., at Hillhead and Crosshill. A messenger travels betwixt the central office and these two sub-offices night and morning for the purpose of conveying books, returns, or correspondence to and from these offices. There is also telephonic communication with the central office, and there is a junior clerk in charge of each of the sub-offices.

The duties of the district inspectors are, generally, to confer daily with the chief inspector; report to and receive directions from him with regard to notices, letters, complaints, plans, and any matters in which there is difficulty; examine the assistant inspectors' notebooks, checking the work, if necessary, and drawing out specifications of remedies in cases of defective drainage, defective ventilation, &c.; inspect personally important nuisances, or those presenting special difficulties, involving alterations of a structural nature; arrange meetings where there are personal differences between landlord and tenant, or between the author of the nuisance and the complainer; supervise the female inspectors' and smoke-testers' work; meet owners at properties in cases of proposed alterations on or extensions of property; and attend the Police or Sheriff Court to give evidence in connection with cases where a prosecution is required.

The chief inspector's clerk opens all correspondence addressed to the chief inspector—unless, of course, where marked "Private." The ordinary letters of each district are arranged by him, being thereafter recorded in a printed form headed "Orders of the Day," and distributed throughout the rooms to the various inspectors every morning by 9.30. In the form above referred to are also recorded the smoke-tests arranged for that particular day, inspections requiring to be made during that day at workshops, stairs, dwellings, and entries, complaints in regard to which had been recorded in the general diary at the public bar. The form containing this information for each district is handed to the chief inspector a few minutes thereafter, at his interview with the district inspectors; the previous day's forms are also laid before the chief inspector at this interview, and he countersigns them, the correspondence of the previous day being reported on by the district inspectors either verbally or in writing.

Each of the assistant nuisance inspectors has (with one exception) one of the twenty-five municipal wards of the city allotted to him. The exception is in the Central District, where four small wards are dealt with by two inspectors. The assistant nuisance inspectors are daily on the track of nuisances, enquiring into all complaints received. They also attend smoke-tests; inspect, measure, and register all houses let in lodgings and farmed-out houses; inspect bakehouses on behalf of the Medical Officer; and inspect dirty houses and clothing, dirty stairs and closes. In connection with the latter, rotation cards for the different tenants are drawn up and delivered by the inspectors.

There is one inspector who devotes his whole time to the inspection of common lodging-houses and boarding-houses for seamen and emigrants.



SANITARY CHAMBERS, MONTROSE STREET.



There has been a gradual diminution in the number of common lodging-houses during recent years, but at the same time those erected or established have been larger and better equipped than formerly. In 1887 there were 101 houses, giving accommodation for 6,273 lodgers, whilst there were in 1903, 62 houses, giving accommodation for 9,558 lodgers. It may be mentioned that the Corporation own seven of these common lodging-houses. Financially they have been a success, and they have at the same time fulfilled the original intention of the Corporation—viz., to be “models” for the private owner to copy and compete with. The seamen and emigrants’ boarding-houses in 1903 numbered 36, giving accommodation for a total of 661 persons. They are under the same regulations as the common lodging-houses.

There are six inspectors employed during the night throughout the whole year for the purpose of keeping down overcrowding in the smaller houses of the city. These inspectors work in pairs, as it is necessary, according to Scotch law, that they should corroborate each other when the prosecutions take place before the Magistrates in the District Police Courts. For a first offence, and where the overcrowding is not of an aggravated nature, the inspectors simply warn the householders implicated. In all other cases summonses are issued against the tenants to appear in the Police Courts, and fines ranging from 2s. 6d. to 10s. are imposed. In many cases, however, the Magistrate merely gives an admonition.

There are about 19,135 small houses in the city having tickets on their doors specifying the cubic contents, the number of the door in the staircase, and the number of inmates allowed. The tickets were formerly made of tin, and the figures painted thereon, but during the past few years cast-iron tickets, specially made at the foundry, have been substituted, the tickets being fixed on to the doors with screw nails.

The powers to ticket houses in this way are contained in the Glasgow Police Acts, the limit of cubic space in the houses authorised to be ticketed being 2,000 feet; but a Provisional Order, which has been passed lately, raises the standard to 2,600 cubic feet.

The continuous and systematic inspection of these small houses since 1870 has been the means of almost clearing the city of typhus fever, which was formerly very prevalent.

Six female inspectors are employed during the day-time inspecting the lower-class dwellings. Their duties are—by persuasion principally—to induce the female householders to keep the interiors of their dwellings in a clean and sanitary condition, and to advise them generally how this can be best maintained. These inspectors wear no uniform, but are provided with a waterproof once in every three years. They, however (like all the male inspectors), are supplied with a warrant card of authority from the chief inspector. They report to the nuisance and infectious disease inspectors any nuisances or cases of infectious disease they may discover. Their wages range from 20s. to 30s. per week. They must, like the male inspectors, have either the certificate of the Sanitary Association of Scotland or that of the Sanitary Institute of Great Britain.

It may be stated that Glasgow was the first place in the kingdom to employ female sanitary inspectors, their appointment going back to 1870.

Drain-testing forms an important branch of the work of the Sanitary Department. Several of the inspectors are daily employed at this work, assisted by a lad, who works the smoke-testing machine. All newly erected properties must, in terms of the Glasgow Building Regulations Act, be tested, and certified by the Sanitary Inspector before the occupancy of the premises is permitted. The same is required where alterations or extensions have taken place. With regard to existing dwelling-houses in which a case of either enteric fever or diphtheria has occurred, the drains are also tested by the department, and a notice specifying any defects, and also the remedies required, is issued to the respective owners. Where there has been illness, or where there are otherwise reasonable grounds for believing that the drainage system is unsatisfactory, the owner is also asked to give facilities for the application of a smoke-test. During the year 1903 there were 4,095 applications of the smoke-test. Of these, 1,526 were for the first time, and in 1,091 cases the drains or soil pipes and connections were found defective. Glasgow, it is believed, stands in the first rank in connection with this matter as compared with other large towns, and it would be interesting to visitors to call any morning at the Sanitary Chambers about 9.30, accompany the inspectors to their work, and see the *modus operandi*.

The sanitary condition of workshops under the Factory and Workshop Acts forms an important section of the nuisance inspectors' work. At present we have six inspectors devoting special attention to the registration, light, ventilation, lavatory accommodation, water supply, lime-washing, and overcrowding of workshops in the city. All workshops are provided with cards by the Sanitary Department showing the number of workers allowed in the day-time, and also when working overtime. Returns are obtained every six months from those employing out-workers, giving the names and addresses of such employees. The houses of those in the city are inspected, and advices sent to any out-workers beyond the city boundaries to the Local Authorities of the particular districts in which they are.

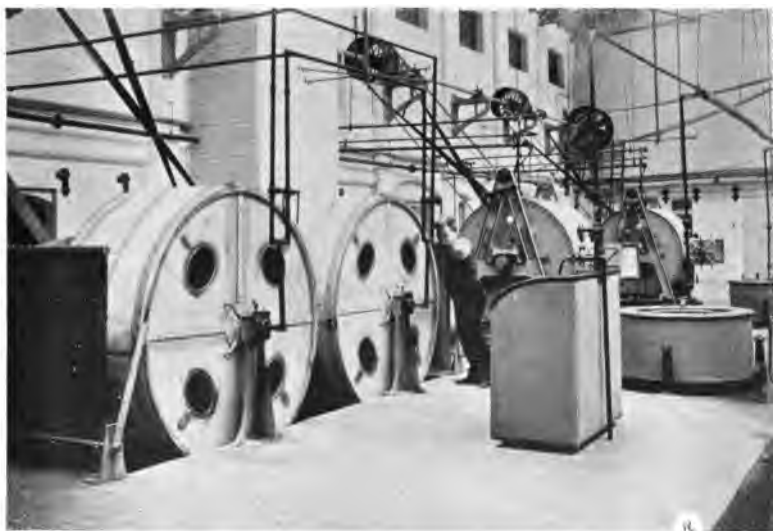
The execution of the work entailed in the prevention of excessive smoke from chimneys, other than those connected with household fires, under the powers contained in the 31st Section of the Glasgow Police (Further Powers) Act, 1892, was transferred on the 31st March, 1899, from the Police, and placed in the hands of the Sanitary Inspector, who had two specially qualified assistants appointed to assist in the work.

The smoke inspectors work, for the most part, together in the discharge of their duties, as all the noted "smokers" have already received a warning notice requiring them to prevent the issue of excessive smoke from their chimneys, two months' "breathing-space" allowance generally accompanying said notice in which to carry out any improvements with this end in view.

The inspectors, in taking observations of smoke emanating from a chimney, proceed by means of lined-off charts diagrammatically. Their observations usually last from twenty to sixty minutes, depending on the quantity of smoke which has been discharged from the chimney and the



DISINFESTION OF CLOTHES.



SANITARY WASH-HOUSE.

nature of the furnaces connected therewith. Each inspector traces his diagram from a different standpoint, and they have no knowledge whatever of each other's work. After the observation is over the inspectors visit the works, if excessive smoke has been found; give a notice to the manager, or other responsible person, intimating that smoke in excess had been found issuing from a particular chimney between stated times; and request to see the furnaces connected therewith. On examining the furnaces they take note of the generally prevailing conditions, such as the state of the furnaces, the type of furnaces, the intensity of the draught, the quality of the fuel, the quantity of such burned per square foot of grate area per hour, also what special means are in use for the purpose of preventing smoke, and generally what was the cause of the smoke produced.

The diagrams, with a detailed statement of the conditions, are afterwards submitted to the Chief Sanitary Inspector, who compares both diagrams and decides, in the light of the circumstances, whether or not a prosecution in the Police Court is necessary—first ascertaining, of course, that the firm in question has already been notified.

The smoke inspectors—who have a thorough knowledge of all that appertains to smoke prevention, as regards improved methods of furnace construction, and special mechanical appliances in use as aids thereto—are instructed to give the benefit of their experience, without prejudice to the Sanitary Department, to furnace users, and in this way they have been very helpful to steam users and others in bringing about improved conditions.

Four inspectors carry out the inspection and sampling necessary under the Sale of Food and Drugs and Margarine Acts. For purposes of corroboration, they work in pairs when taking samples. In addition to taking samples from shops, they visit every morning the railway stations at which supplies of milk arrive from the country, testing or taking samples, as required. These inspectors also have the inspection of all milk shops and milk stores in the city, and the enforcement of proper lighting, cleanliness, and cubic space in byres. No person is allowed to sleep in premises in connection with milk shops or milk stores. Ice-cream shops are now, by our local Police Acts, under the same regulations as milk shops.

The detection of unwholesome provisions is also a part of these inspectors' duties. They visit daily provision shops, and one of them also inspects the public fruit and vegetable markets every day. The inspection of butcher meat was, until 1900, under the Sanitary Inspector also; but at that time this work was transferred to the Veterinary Surgeon at Moore Street Market, who has now a staff of his own for this purpose.

One inspector, under the directions of the Chief Sanitary Inspector, devotes his whole time to the inspection of fish. He is daily in attendance at the Fish Market, and during a portion of the day is engaged in inspecting fishmongers' shops, hawkers' barrows, &c.

A special officer is appointed to carry out the provisions of the Shop Hours Acts, 1892 to 1895, and the Seats for Shop Assistants Act, 1899, giving his whole attention to this work. He sees that the requirements of the Acts are carefully carried out in all the shops in the city where

young persons are employed, and that the notice cards are exhibited in the shops, in a conspicuous place, giving principal clauses of the Act, viz., that no young person under eighteen years of age shall be employed in or about a shop for a longer period than 74 hours per week. On the 1st January, 1900, the Seats for Shop Assistants Act, 1899, came into operation. It requires that, where females are employed in retail shops, seats must be provided in the proportion of not less than one seat to every three female assistants employed in each room of such premises. There has been such a general compliance with its terms that it has not been found necessary to institute any prosecution under this latter Act.

On 1st October, 1903, Glasgow was constituted the Port Local Authority for the River Clyde from Greenock to Glasgow. The Sanitary Inspector was appointed Interim Port Inspector. Offices have been provided at Princes Pier, Greenock, where one inspector of nuisances is stationed, who boards the vessels as they come to anchorage or stop for purposes of medical inspection, &c. The inspector records any nuisances observed, and advises the chief inspector in Glasgow of them. These comprehend such nuisances as dirty forecastles, inadequate ventilation of forecastles, ventilators plugged up, accumulations of rubbish within forecastles, deck and port lights defective, water-closets defective or foul, &c. One assistant inspector is also stationed at Glasgow, who makes fuller inspections of the vessels, and notifies the captains or owners, on prescribed forms, of the various nuisances discovered, specifying remedies required for their abatement.

For a long time there has been carried out every summer by the Sanitary Department the limewashing of privies and wet ashpits in the city, as special cholera precautions. The entire cost (about £120 per annum) is borne by the Sanitary Department.

During the past two years a special survey of all licensed premises in the city, with regard to sanitary conditions, was carried out by the officers of the Sanitary Department. The inspection covered hotels, restaurants, railway refreshment rooms, theatre bars, public-houses, and licensed grocers' shops. The total number of these is over 1,700. A special report dealing with the lighting, ventilation, cleanliness, sufficiency of lavatory accommodation, &c., was prepared for the information of the licensing bench. In a great many cases alterations, according to plans which had to be approved of by the Sanitary Inspector, were carried out, at considerable cost to either the licensees or owners of the properties.

The reception-houses for the boarding of the inmates of infected dwellings for a period of seventeen days were, up to a recent date, under the management of the Sanitary Inspector; but they have now, by arrangement, been transferred to the Medical Officer.

The Police Magistrates grant licenses to all keepers of cows within the city. The number of dairy byres within the boundaries of the city has been gradually decreasing, and at present there are only 91. These premises are inspected and reported on by the Sanitary Inspector previous to the date of the Court.

The Magistrates also license piggeries and brokers' shops, and applications for these are dealt with in a similar manner to those for cow-houses and byres.

The offensive trades within the meaning of the Public Health (Scotland) Act, 1897, number at present 59. These comprise the businesses of blood boiler, bone boiler, glue and size manufacturer, gut or tripe cleaner, knacker, manure manufacturer, skinner or hide factor, soap boiler, tallow melter, tanner, tripe boiler, and horse slaughterer. Application, in writing, for permission to carry on any of the above trades must be made to the Clerk to the Corporation (Police Department), accompanied by a plan of the premises and a specification detailing the nature of the trade to be carried on. These are remitted by the Health Committee to the Medical Officer and Chief Sanitary Inspector to visit and report. The applications must, in terms of the Act, be advertised in the Glasgow newspapers, in order to give anyone interested an opportunity of objecting. Failing any such objection being made, and provided the two officials report favourably, the necessary permission is invariably granted. A series of bye-laws for regulating these places has been drawn up by the Corporation—(1) as to the conduct of the business; (2) as to the structure of the premises in which any such business is being carried on, in order to prevent or diminish the noxious or injurious effect thereof; and (3) as to the form of application to be made for sanction for the carrying on of such business. These works are regularly inspected by the sanitary officers, in order to detect any infringement of the bye-laws.

Special surveys are made from time to time of the various cemeteries and burial-grounds, and an annual inspection is made during the summer time of the various burns or streams in the city, with the object of causing them to be cleared of debris, &c., by the parties entitled to do so.

The Sanitary Department during the year 1902 interred, at its expense, 545 unclaimed and other dead bodies, under the Public Health Act. In 192 cases the bodies were from public institutions, and 253 from private houses. The total cost was £413 13s. 6d., of which £53 4s. 11d. was recovered either from the friends of the deceased or from the institution authorities. In the cases of seventeen applicants the Sanitary Department refused to carry out the interment.

A return of much interest has lately been prepared of the houses closed as unfit for human habitation under Section 32 of the Glasgow Police (Amendment) Act, 1890, with relative particulars. This return embraces the period from 1891 (when the Act came into operation) to 18th April, 1904, and shows that during that period 859 dwelling-houses were condemned and closed. Of these, 213 still remain closed; 186 have been converted into business premises; 56 have, after alterations, been re-occupied as dwellings; 4 have been converted into water-closets, and 1 into a wash-house. In 382 cases the houses were taken down, and of this number 127 were rebuilt as dwellings, 57 were rebuilt as business premises, 12 were in course of reconstruction, and 186 were not rebuilt, while 17 were at that date in course of demolition.

Section 32 of the above-mentioned Act, authorising uninhabitable houses to be dealt with, is as follows:—

“If the Medical Officer, the Sanitary Inspector, and the Master of Works of the City shall certify in writing to the Police Commissioners that any house or building or part of a house or build-

ing, is unfit for human habitation, the Police Commissioners may, by their order, affixed conspicuously on such house or building, declare that the same is not fit for human habitation, and it shall not, after a date in such order to be specified, be inhabited; and every person who shall, after the date or time mentioned in such order, let or occupy, or continue to let or occupy, or suffer to be occupied such house or building, or part of such house or building, shall be liable to a penalty not exceeding five pounds, and to a daily penalty not exceeding forty shillings: Provided always that, before pronouncing any such order, the Police Commissioners shall require the owner to show cause against the said certificate within such time as they may consider reasonable, and shall give such owner an opportunity of being heard before them, and, if he appear, shall hear him and such evidence as he may adduce: Provided also, that if at any time after such order has been made the Police Commissioners shall be satisfied that such house or building, or part of such house or building, has been rendered fit for human habitation, they may revoke or vary the said order, and the same shall thenceforward cease to operate or be modified accordingly. For the purposes of this section the Police Commissioners may act by a committee of their number, and the quorum of the committee shall not be less than five.

"Any person aggrieved by any order under this section may, within five days from the date of intimation thereof, appeal to the Sheriff, and the Sheriff shall, with all reasonable despatch, and, if practicable, within seven days after the presentation of the appeal, dispose of the same, with or without expenses, and his decision shall be final, and not subject to review; but the confirmation of any such order by the Sheriff shall not prevent the Police Commissioners, if they are satisfied the house or building, or the part of the house or building to which such order relates, has been rendered fit for human habitation, from revoking or varying such order."

There are two wash-houses and disinfecting stations, viz., at Belvidere and Ruchill, adjacent to the hospitals. During the year 1903 the number of articles dealt with at Belvidere was 265,691, and at Ruchill 216,319. Each station has steam washing machines, dash-wheels, dollies, drying stoves, steam disinfectors, carpet-beating machine, &c. The clothing from infected houses enters at one side of the works, and is sent out at the other clean and disinfected. The staff at each wash-house comprises superintendent, engineer, fireman, machineman, stableman, van drivers, clothing collectors, washerwomen, and a clerk. All the washing and disinfecting of clothing, bedding, &c., as well as the disinfection of infected houses, is done at the cost of the Sanitary Department.

The method of carrying out the disinfection is as follows:—Orders from the inspectors who deal with infectious diseases, and act under the Medical Officer of Health, are placed every evening in the hands of the managers of the respective wash-houses, these orders being taken a note of by a staff of checkers attached to the Sanitary Chambers. The

checkers visit the houses and check all articles of bed and body clothing, and also take a note of all articles of furnishing which are to be removed for disinfection, a duplicate of the checking being left with the party in the house. The clothes are then removed to the wash-house for disinfection and washing. All washable articles are washed in the usual way, outside garments being fumigated only, either sulphurous acid or the formalin lamp being used in the latter case. The fumigation of houses is carried out by burning sulphur (2 lbs. to every 1,000 cubic feet of space in the apartments). A specially devised pan is used, having a water-jacket lining on bottom and sides, the burning of the sulphur causing steam to be generated and to escape through holes in the rim of the pan; this increases the efficacy of the sulphur vapour. In the worst cases of infectious disease—such as typhus, smallpox, or malignant scarlet fever—the apartments are sprayed by a machine with a 4 per cent. solution of formaldehyde, and afterwards whitewashed, the whitewash containing $\frac{1}{2}$ per cent. of izal.

There are eleven children's playgrounds in the city, each having a caretaker. These grounds and caretakers are under the charge of the Sanitary Inspector. For details of cost, extent, &c., see page 74.

The upkeep of these children's playgrounds during a year (including wages) amounts to about £1,200. These grounds are furnished with swings, maypoles, and other gymnastic appliances, and are open every week-day from 9 a.m. to half-an-hour after sunset. The most extensive and beautiful is called the "Phoenix" (after an old unused and dilapidated foundry formerly existing on the site), and is situated in a densely populated part of the Northern District. The Corporation has recently acquired ground in the same locality—viz., in Society Row—and estimates are at present being taken for the formation of another playground there.

Lately an arrangement was entered into with the School Board whereby three of the Board's school playgrounds were fitted up, at the Corporation's expense, with suitable gymnasia. These are used after school hours by all the children in the locality. The janitors attached to the schools act as caretakers, and are paid by the Sanitary Department.

In 1883, on the suggestion of the Kyrle Society, the Sanitary Department laid down 192 seats, or "City Rests," in various parts of the city. That number has now been increased to 288. The cost of these seats and their upkeep is borne by the Sanitary Department. They are placed in squares or suitable points on the side-walks of streets throughout the city, and are under the charge of the Sanitary Inspector.

The illustrations are from photos. taken by Inspector William Ramsay, Sanitary Department.

The following brief statistics for the year 1903 may be of interest:—

Area of City,	12,688 acres.
Persons per acre,	61.64
Total inhabited houses,	162,443
Nett increase of inhabited houses compared with Census 1901,	7,039

	Name of Playground.	Size of Ground.	Date Acquired.	Cost of Ground.	Cost of Fitting up, &c.	Cost of Upkeep during year 1902-3.	Remarks.
1.	Braid Street, -	Sq. yds. 417	1889	...	£128	£89	Three years' lease from Gosman & Smith just entered upon, £25 per annum.
2.	Gorbals, -	600	1893	£595	306	75	Ground purchased from City Improvement Trustees.
3.	Phenix, -	11,802	1893	20,205*	5,219	323	Ground purchased from Phenix Foundry Company.
4.	Oatlandsbank, -	4,170	1894	...	1,130	80	Ground leased from City Improvement Trust at nominal rent of 20s. per annum.
5.	Baltic Street, -	1,960	1896	...	610	105	Leased from Cleansing Department at a rent of £30 per annum.
6.	Great Eastern Road,	420	1896	...	289	63	Gifted by Statute Labour Committee.
7.	Paterson Street, -	1,020	1898	2,763	690	82	Purchased from Glasgow Samaritan Hospital for Women.
8.	Queen's Park, -	2,400	1898	...	706	80	Belongs to Parks Department.
9.	Overnewton, -	1,860	1899	...	942	85	Gifted by Parks Department.
10.	Garngad Road, -	7,665†	1899	2,908	1,247	79	Purchased from Mr. Edward Tennant.
11.	Bain Square, -	1,300	1899	...	197	132	Gifted by Improvement Trustees.
		33,614		£25,471	£	£1,193	

* Less net proceeds of sale of building material.

† The space occupied by Gymnastic Appliances, 2,136 square yards,
Shrubbery, - - - 351 " "

Houses ticketed for night inspection,	19,135
Estimated population (including Institutions and Shipping, 19,040),	782,110

(Note.—The City population shows a nett increase in two years of 21,946, and the Institutions and Shipping a nett decrease of 1,548.)

Population at Census 1901—	
Found occupying 1 apartment,	14.0
“ “ 2 apartments,	47.0
“ “ 3 “ “,	20.5
“ “ all others,	18.5
Total nuisances recorded in 1903,	45,308
“ “ per acre,	3.57
“ “ per 100 houses,	26.94
Workshops on the register,	4,027
Nuisances per 100 workshops,	38.28
Dairy byres,	89
Offensive trades,	59

(c) BACTERIOLOGICAL.

THE inception of the Bacteriological Laboratory dates from 1895, when the new Sanitary Chambers were in course of construction. The Committee on Health, at a meeting held on 6th January, 1896, under the chairmanship of Councillor Robert Crawford, resolved to recommend the establishment of a Bacteriological Department within the new building, as an aid to public health administration. This recommendation, which was unanimously adopted by the Corporation a few days later, was the outcome of a memorandum, dated 16th December, 1895, by Dr. Chalmers, then Junior Medical Officer of Health. The progress of bacteriology had sufficiently demonstrated that the diagnosis, and especially the early diagnosis, of many cases of infectious disease, was only possible by the new methods of that science, and had made it evident that the systematic application of bacteriological methods in cases of a doubtful nature would greatly facilitate administrative action, and also lessen the risk of having persons erroneously isolated in hospital or left in unrestricted freedom.

While the institution of a Bacteriological Department, with these objects in view, marked a very definite step in the progress of the public health administration of the city, it was essentially a further development of the policy which had been adopted by the Corporation on 23rd April, 1881, of accepting responsibility for the isolation and treatment of all infectious diseases occurring within the city free of charge.

The new Sanitary Chambers were occupied in May, 1897, and the

equipment of the laboratory was forthwith undertaken by the Medical Officer of Health.

In view of the growing importance to the community of bacterioscopic analysis, and the wide range of the subject, it was considered essential that a bacteriologist should be appointed to devote his whole time to the duties of the office. This was accordingly carried into effect by the Corporation on 18th September, 1899.

Facilities for carrying out biological tests were provided by the Corporation in the following year by the erection of a suitable building in the courtyard of the new Sanitary Chambers. This building consists of a ground floor and upper floor (as shown in plan), and was constructed with the object of housing the animals under the conditions of cleanliness, warmth, ventilation, and nutrition essential in the carrying out of biological tests successfully. One room is reserved as a run for healthy animals, and three for animals which have been inoculated. The building also contains a museum and a dark room for micro-photography.

A circular was issued by the Medical Officer of Health on 1st January, 1900, inviting every medical practitioner within the city to avail himself of the resources of the laboratory for the bacteriological diagnosis of doubtful cases of infectious disease, and more especially diphtheria, enteric fever, and tuberculosis. At the same time a suitable equipment was provided for the safe transmission of specimens by post or messenger to the laboratory. A report of the bacterioscopic examination was forwarded on the day of receipt or on the following morning, and along with this report a fresh equipment was enclosed, so that the physician might always have ready to hand the means of forwarding similar specimens without delay. The loyal response accorded to this invitation is attested by the following tables giving for the past four years (1) the number of specimens thus received, (2) the results obtained, and (3) the number of practitioners from whom the specimens were received. From table III. it will be observed that during last year 360 practitioners availed themselves of the resources of the laboratory, which is equal to 79 per cent. of those in general practice within the city.

TABLE I.—SHOWING NUMBER OF SPECIMENS RECEIVED FROM MEDICAL PRACTITIONERS WITHIN THE CITY FOR BACTERIOLOGICAL DIAGNOSIS IN REFERENCE TO DIPHTHERIA, ENTERIC FEVER, AND TUBERCULOSIS FOR THE YEARS 1900, 1901, 1902, AND 1903.

Year.	SPECIMENS.			
	Diphtheria.	Enteric Fever.	Tuberculosis.	Total.
1900	353	543	351	1,247
1901	438	1,048	565	2,051
1902	712	807	847	2,366
1903	997	1,014	932	2,943

TABLE II.—SHOWING THE PERCENTAGE OF POSITIVE RESULTS OBTAINED.

Year.	Diphtheria.	Enteric Fever.	Tuberculosis.	Average.
1900	28.3	51.8	43.6	42.8
1901	30.0	49.0	36.0	41.5
1902	35.5	38.3	35.0	36.3
1903	34.8	46.8	32.7	38.3

TABLE III.—SHOWING THE NUMBER OF MEDICAL PRACTITIONERS FROM WHOM THE ABOVE SPECIMENS WERE RECEIVED, AND THE AVERAGE NUMBER FROM EACH PRACTITIONER.

Year.	Practitioners.	Average Number of Specimens from each Practitioner.
1900	246	5.07
1901	283	7.25
1902	304	7.78
1903	360	8.17

In addition to the routine bacteriological diagnosis of the diseases already mentioned, suspected cases of cholera, plague, influenza, pneumonia, anthrax, glanders, and rabies have not infrequently called for diagnosis and preventive investigation. During the outbreaks of plague in the city in 1900 and 1901, the diagnosis of every case was established by bacteriological methods, and numerous investigations bearing on the problems which confronted the Health Department for the first time were undertaken.

The laboratory has also been placed at the service of the newly-constituted Port Sanitary Authority. In the strict watch which is maintained for the entrance of plague and cholera, bacteriological diagnosis forms an essential and responsible part.

In view of the important rôle played by rats in the spread of plague, large numbers are brought to the laboratory to be examined for any evidence of this disease. They are obtained from various parts of the city, from the harbour, and from ships arriving from plague-infected ports. In the last four years 11,236 rats have thus been examined, and of these 154 have been found to be infected with plague. (Vide table IV.)

TABLE IV.

Year.	Number of Rats examined at the Laboratory with reference to Plague.	Number found Infected with Plague.
1900	326	...
1901	1,641	108
1902	6,492	46
1903	2,777	...
Total, -	11,236	154

The bacteriological analysis of the milk supplied to Glasgow forms a part of the work of the laboratory. With this is associated the tracing of the infective agent in the milk-borne epidemic outbreaks which occur from time to time. At intervals the food supply, especially preserved foods and meats and shell-fish, also call for examination.

In connection with other departments of the Corporation, the applications of bacteriology are also of great importance, as in the examination of the water supply, and in investigations relating to sewage disposal, both of which are undertaken in the laboratory. An estimate of the bacterial content of Loch Katrine water as it is delivered from the tap, has been made since the beginning of 1900, and is summarised in table V. The water supply is also systematically kept under observation for any evidence of disease-producing organisms.

TABLE V.—SHOWING THE MONTHLY AVERAGE NUMBER OF BACTERIA FOUND IN 1 C.C. OF LOCH KATRINE WATER AS IT WAS DELIVERED TO THE CONSUMER DURING THE PAST FOUR YEARS.

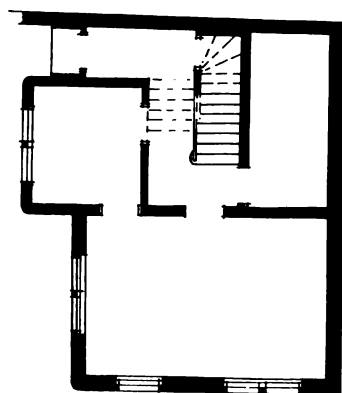
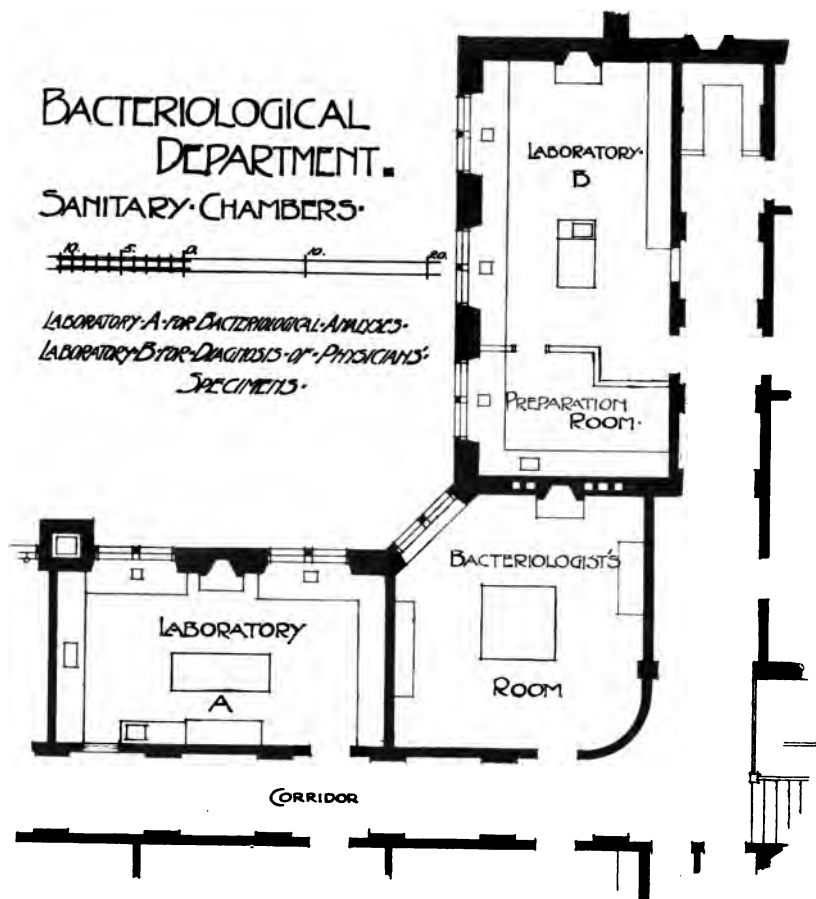
Month.	1900.	1901.	1902.	1903.
January, - - - -	52·5	44	51	148
February, - - - -	86	31	39	182
March, - - - -	49·5	39	50·5	79
April, - - - -	30	34	28	58
May, - - - -	41	32·5	24·5	35
June, - - - -	44	41·5	41	35·5
July, - - - -	68·5	226	43·5	75
August, - - - -	65·3	168	70·5	74·5
September, - - - -	69·5	104	71	63·5
October, - - - -	115	95·5	...	54
November, - - - -	104	84	81	41
December, - - - -	51	64	96·5	63
Average per month, - -	64	80	54	75

BACTERIOLOGICAL DEPARTMENT.

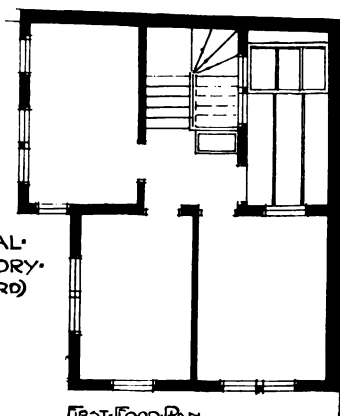
SANITARY CHAMBERS.



LABORATORY A FOR BACTERIOLOGICAL ANALYSES.
LABORATORY B FOR DIAGNOSIS OF PHYSICIANS'
SPECIMENS.



GROUND-FLOOR PLAN.



FIRST-FLOOR PLAN

BIOLOGICAL
LABORATORY.
(IN COURTYARD)

The laboratory is situated in a room (26 feet by 14 feet) on the second floor of the Sanitary Chambers. For sometime past the accommodation has been found to be insufficient for the increasing amount and complexity of the work, and the consequent increase in the staff which has taken place. An extension of laboratory accommodation has accordingly been sanctioned by the Corporation, and is at present in course of equipment. The extension, as shown in the accompanying plan, adjoins the present laboratory, and consists of a room (B, 23 feet by 15 feet 6 inches) for diagnostic work, a preparation room (C, 10 feet 6 inches by 15 feet 6 inches), and a private room or office.

The staff of the department as at present constituted comprises the bacteriologist, two assistant bacteriologists, and two laboratory attendants.

(d) CHEMICAL.

PRINCIPALLY through the efforts of Baillie D. M. Stevenson the Municipal Chemical Department was established. A thoroughly equipped laboratory was provided suitable to the needs and requirements of analytical work in connection with "Municipal Chemistry."

The laboratories of this department were first placed in operation during March, 1900. Monthly reports on the analytical work undertaken are submitted by the Chemist to the Chemical Department Committee of the Corporation.

A scale of fees has been formulated, according to which charges are made against the different departments of the Corporation utilising the services of the Chemical Department. A glance at one of the monthly reports submitted by the Chemist will indicate very clearly what is implied by the designation "Municipal Chemistry."

In the laboratories of this department the food supply of Glasgow's teeming population is chemically supervised, and the sophistications of food stuffs discovered, which, when found, are duly reported to the Sanitary Department, who then institute legal proceedings against the vendors of such adulterated food material. During the year something approaching 700 samples of food, liquors, and drugs are submitted to this department for certification as to the genuineness or otherwise of the same.

The question of a pure food supply is one, the importance of which, from a public health standpoint, cannot be overstated, apart altogether from the monetary saving to the citizens of Glasgow effected by a thorough control of the food supply. This is one of the important aspects of "Municipal Chemistry."

The Chemical Department is also responsible for the chemical work necessary to the efficient control of the sewage disposal works.

At each of the sewage disposal works of the Corporation a chemical laboratory is provided in the works, and an assistant of the Chemist stationed permanently there. Daily analyses of the crude sewage entering the works, and the purified effluent discharged therefrom, are made, and the results obtained periodically reported upon to the Sewage Committee.

The importance of the question of sewage disposal is acknowledged, and necessitates frequently the execution of experimental work to endeavour to elucidate the different problems constantly arising.

Amongst the notable experiments carried out for the Sewage Committee by this department may be mentioned "Bacteriological Treatment of Sewage," "Nature of Trade Effluents and their Effect on the Purification Process," "Efficiency of Various Precipitating Agents," and many other experiments bearing on sewage disposal. This important question of sewage disposal is another aspect of "Municipal Chemistry."

In controlling the quality of store materials of a widely diverse nature purchased by the various departments of the Corporation, the Chemical Department is destined to play a very important rôle. Already in the case of paints and oils a special committee of the Corporation have drawn up specifications for every class of paints, oils, &c., employed by each department of the Corporation. These materials are, therefore, purchased to specification, and the quality controlled from time to time by chemical analyses. In this manner the interests of the Corporation are safeguarded against the purchase of inferior materials. Besides the analytical work implied by the term "Municipal Chemistry" already described, a very considerable volume of work is constantly executed by the Chemical Department, which may be summarised under the heading of "General Work," such as analyses of waters; examinations of air in schools, workshops, and underground bakehouses; analyses of soaps, disinfectants, and general store materials; mineralogical examinations, such as analyses of copper, steel, alloys, &c.; and various other important analyses of such varied nature as to totally preclude classification.

At the present time, whilst the important question of our smoke-polluted atmosphere is engaging the attention of the Corporation, experiments are to be instituted by this department, in conjunction with the Chief Sanitary Inspector, to ascertain the extent of the atmospheric contamination, both in respect to gaseous pollution as well as solid pollution. In addition, an estimate will be made of the nature and quality of the contamination emanating from factory and domestic chimneys; also from smelting and furnaces of all descriptions. It is anticipated that in this manner the question of "Aerial Sanitation" will be placed upon a sound scientific basis, the essential preliminary step for a satisfactory solution.

The Chemical Department has been no exception to the other enterprises of the Glasgow Corporation in that, since its inauguration, the volume of analytical work performed has considerably increased, whilst the usefulness of such a department to the various departmental committees of the Corporation has received increased appreciation. Almost every department of the Corporation now utilises the services of the Chemical Department, both for analytical work and to obtain expert chemical advice.

During the four years of the department's existence the original working accommodation provided was found too limited, and the Chemical Department is now housed in more commodious laboratories situated in 26 John Street.

(e) VETERINARY.

PRIOR to the 1st June, 1900, meat inspection in Glasgow was under the dual control of the Sanitary Inspector and of the Chief Constable. The former official was responsible for the inspection of the meat exposed in the various butchers' shops, sausage factories, &c., and also for the examination of the meat consignments arriving in the city by road, rail, and river, whilst on the police devolved the duty of examining the carcasses and viscera of the animals slaughtered in the four public abattoirs. Under both of these officials, nine inspectors in all were employed in supervising the city's meat supplies. The Corporation, however, considered that the work of inspection would be best performed were it to be consolidated and placed under the control and direction of one official. The official selected was the Veterinary Surgeon to the Corporation (Police Department). It merely required a few weeks to show that this number of inspectors, *i.e.*, nine, was inadequate, if the work of inspection was to be thoroughly and efficiently carried out. The Corporation, therefore, decided to augment the staff by eight additional inspectors. At present the staff comprises—a chief veterinary surgeon, two assistant veterinary surgeons, fourteen meat inspectors. The latter are butchers, and, before appointment, were subjected to an examination in the subjects as recommended by the Royal Commission on Tuberculosis, 1898, pp. 21-25, and also in accordance with the terms of the circular letter of the Local Government Board for Scotland, of the 19th October, 1899.

By the "Glasgow Markets Act of 1845" private slaughter-houses in Glasgow were abolished, and now all animals destined for human food are slaughtered in one or other of the public abattoirs. In Glasgow there are four public abattoirs, three for the slaughter of home cattle and one for the slaughter of foreign cattle.

During the year 1902 there were slaughtered:—

HOME.

Cattle.	Calves.	Sheep.	Swine.	Goats.	Total.
70,239	2,433	285,401	47,967	15	406,055

FOREIGN.

Cattle.	Calves.	Sheep.	Swine.	Goats.	Total.
28,439	2	12,799	—	—	41,240

The system which obtains in the different abattoirs is that known as the "Belgian System," in that the lay inspector examines the carcass and viscera of every animal as it is dressed, and if the carcass is found affected by any morbid condition injurious to the health of man, it and all the internal organs are labelled "Detained for Inspection," and are forwarded to a large room specially

set apart for the reception of diseased meat. The lay inspectors examine in the slaughter-room the lymphatic glands of the head, lungs, liver, and bowels. If any or several of these organs are affected with tuberculosis or other localised disease, the organ or organs need not be removed to the reception room, but may be removed to the diseased meat room for boiling-down purposes. The owner of the meat, however, has it in his option to request that any or every organ be removed to the reception-room for the decision of the chief veterinary surgeon. The carcase and organs which have been removed to the reception-room are examined by two inspectors; a careful record is kept of the disease (and, in the case of a tubercular carcase, the extent of the disease) and the measures which have been adopted.

The standard by which a tubercular carcase is judged as to its fitness or otherwise to be used for human food is that recommended by the Royal Commission on Tuberculosis which reported in 1898, with the single exception of swine. The Commissioners recommended that—"In view of the greater tendency to generalisation of tuberculosis in the pig, we consider that the presence of tubercular deposit in any degree should involve the seizure of the whole carcase and of the organs."

It was found, however, that the lymphatic glands of the throat were, in the majority of cases, the only seat of tuberculosis, and it was, therefore, deemed that the ends of justice would be attained by the seizure, in these cases, of the head only.

The following table shows the number of carcasses totally or partially destroyed during the year 1902:—

CATTLE.									
Oxen.	Bulls.	Cows.	Heifers.	Calves.	Total.	Swine.	Sheep.	Goats.	Total.
157	92	2,437	34	7	2,727	123	312	1	3,163

In addition to these, there were destroyed during the same period—

Lungs.	Hearts.	Bowels.	Stomachs.	Livers.	Spleens.	Kidneys.	Udders.	Heads.
9,040	28	2,464	493	28,149	263	84	152	4,211

The freedom from disease of the animals landed at the Foreign Animals Wharf, Yorkhill, is an extremely interesting object lesson to the stock owners of this country.

Of the home cattle slaughtered, 13 per cent. were found, on *post-mortem* examination, to be in a greater or less extent affected with tuberculosis, whilst of the animals landed at the Foreign Animals Wharf only 44 per cent. were found to be thus affected.

Meat prepared outwith the city boundaries is imported into the city by road, by rail, or by river. The detective system of meat inspection still obtains, and therefore a number of meat inspectors are detailed to examine consignments as they arrive at stations, wharves, hide marts, carriers' quarters, &c. During the year 1902, 557 consignments were seized. Of these, 371 were seized at the railway stations, 12 at the

wharves, 169 at the hide marts, and 5 on carts. They were consigned from the different counties as follows:—

Wigtown,	235
Ayr,	168
Argyle,	37
Lanark,	32
Dumfries,	22
Renfrew,	13
Stirling,	12
Dumbarton,	1
Fife,	1
Forfar,	1
Unrecorded,	30
	<hr/>
	552
Ireland,	5
	<hr/>
	557

It ought to be stated a more rational system would be to insist on all meat prepared outwith the city being brought to an examination station, and there inspected and passed by a Corporation meat inspector before being offered for sale.



The shops, sausage factories, and all premises where meat is prepared for human food are visited at least once every two weeks. This necessitates the employment of three inspectors.

An officer of this department visits the Corporation fever hospitals, and inspects the meat supplied by the contractor.

A private slaughter-house, licensed under the "Public Health (Scotland) Act, 1897," has been established for the dressing of horse flesh to be used as human food. The number of horse carcasses thus disposed of varies from year to year.

During the year 1902, 652 horse carcasses were passed as fit for human food. Stringent regulations have been drawn up for the conduct of this

slaughter-house. These regulations require that all horses slaughtered must be inspected by the Veterinary Surgeon to the Corporation or by one of his assistants prior to slaughter. After a *post-mortem* examination, if the flesh is found to be fit for human food, it is marked with a stamp, as shown on previous page.

The milch cows housed in the city byres are examined by a veterinary surgeon once every two weeks, and more frequently when necessity arises.

Every animal is examined for clinical evidence of disease, and every udder is examined for any abnormality. A sample of milk is drawn from every cow with an indurated udder. This is submitted to a microscopical and biological examination for evidence of tuberculosis.

As an aid to the diagnosis of tuberculosis, any muco purulent discharge from either the lungs or vagina is removed for microscopical and, if need be, biological examination. The advantages of examining these discharges are great, and are invaluable for the clinical diagnosis of this disease. It must be noted, however, that, so far as pulmonary tuberculosis is concerned, it is only where the lungs are extensively affected, and where there has been a breaking down of a tubercular focus and a discharging of its contents into the bronchus, that tubercle bacilli can be demonstrated in the discharge.

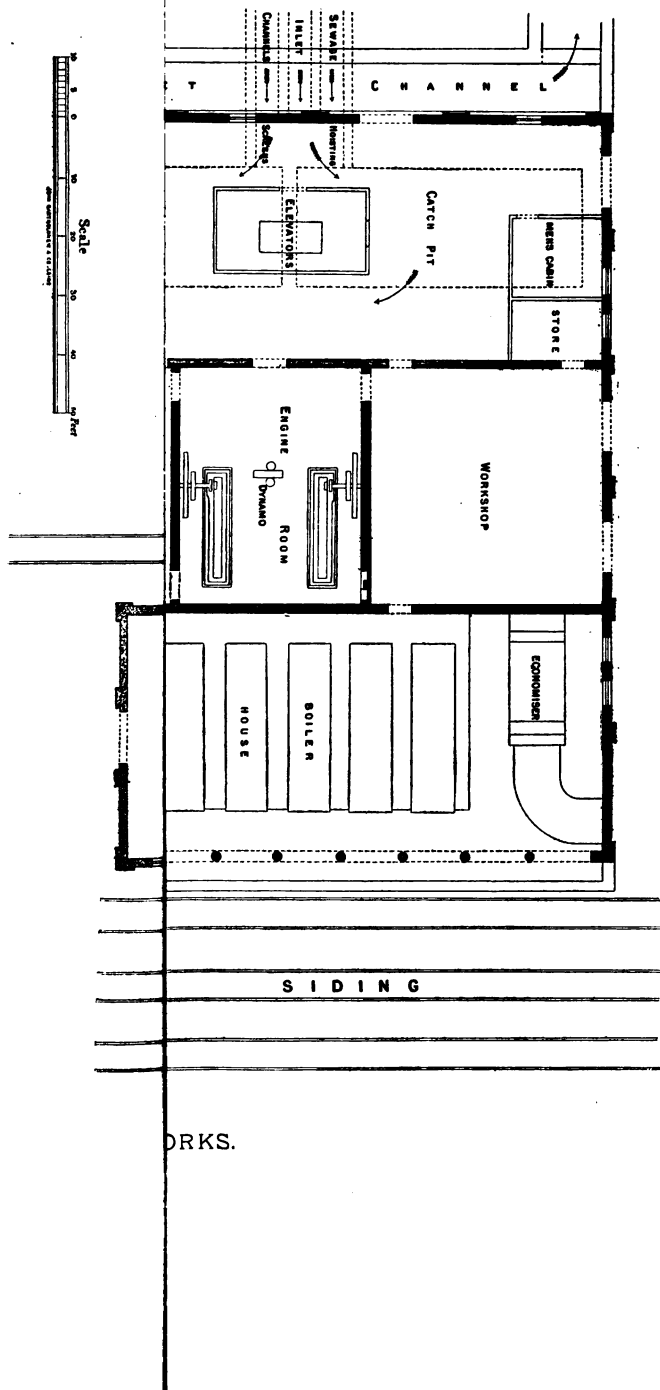
The herds supplying the fever hospitals with milk are visited at short intervals, and a general supervision of the production of the milk supply, as required under the milk contract, is exercised.

SEWAGE.

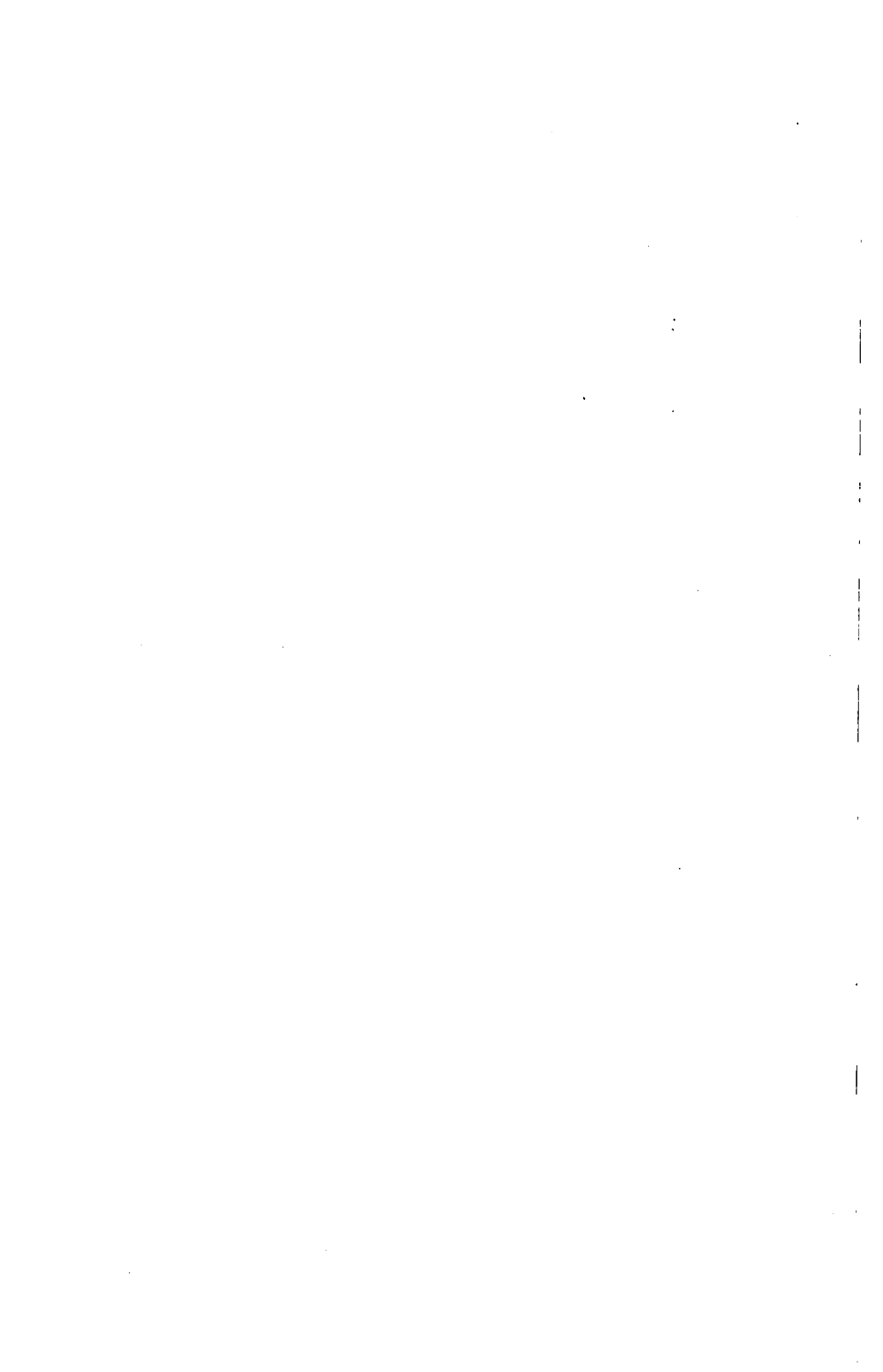
EASTERN DISTRICT WORKS.

THE main sewer from the city, 7 feet 6 inches in diameter, is brought down the centre of Swanston Street and led into the entrance chamber, which is 17 feet by 9 feet by 16 feet 1 inch deep, and situated at the north-west corner of the precipitation tanks. From this chamber the sewage is taken into the machinery building by three 4-feet by 4-feet invert channels placed underneath the precipitation tanks, to the west side of the catchpits, where it has to pass through two double vertical screens, the bars of which are $\frac{5}{8}$ inch apart. It then flows into the 5-feet feed channels on the west side of the catchpits. The level of this channel is 18 feet 6 inches below floor line.

The sewage flows from the 5-feet channel into the two catchpits, each of which is 47 feet 10 inches long by 20 feet broad and 10 feet deep. The bottom of the catchpits at the elevator trough is 28 feet 6 inches below the floor line, and rises to the north and south end walls, which enables the soft material to gradually come forward to the elevator trough, the bottom of which is 33 feet 6 inches below the floor line. The solids are raised by the elevator buckets into a railway wagon on the floor level. Each catchpit can be wrought separately as may be required. The sewage, free of the heavy matter, thereon flows from the catchpits into a 10-foot channel on the east side, leading to the pump well, the depth of which is 31 feet 1 inch below floor line.



DRKS.



The suction pipes from the centrifugal pumps are led down to within 15 inches of the bottom. The water is raised through these into a 3-feet 9-inch cast-iron pipe placed against the south wall of the pump-room, through which it flows into the mixing pit, where the chemicals are introduced. Sulphate of alumina and lime are the precipitants at present used, in the proportion of 2 of alumina to 1 of lime. The quantities used vary according to the nature of the sewage.

There is one 24-inch, two 18-inch, and two 15-inch pumps, with a total of 530 horse-power, capable of raising 2 million gallons per hour. The two 6-inch pulley pumps on the east side of the pump-room discharge the sewage into the lime mixers over the sludge tanks. This water is used for making milk of lime and dissolving the sulphate of alumina.

These pumps are driven from the main line of shafting, which is wrought from the engine-room, where there are two pairs of compound condensing engines, each of 120 horse-power. The precipitated sewage water is used for the condensers. These engines drive all the shafting. There is a dynamo in this engine-room which gives off 130 amperes at 110 volts. There is also one compound wound dynamo, to give 250 amperes at 110 volts, situated in the pump-room. Either of these can supply the whole light for the works. There are 35 arc lamps of 5 amperes each, and 160 incandescent lamps of 32 and 16 candle power.

Leaving the sewage water at the mixing pit, which is 10 feet by 10 feet by 8 feet, with a centre tongue going down to within 3 feet 6 inches from the bottom, the sewage mixed with the chemicals passes under this tongue into an outlet channel, 8 feet by 3 feet 6 inches, which leads to the feed channel of the precipitation tanks.

The mixing pit is situated in the south-east corner of the main floor, over the catchpits.

The sludge from the precipitation tanks is brought into the works by a 6-feet 6-inch main channel, starting at a depth of 17 feet 4 inches from the west wall of the sulphate of alumina room. This channel rises 3 inches in 100 feet till it reaches the front of the west section of the precipitation tanks. There is a sludge channel, 3 feet 3 inches wide, in each section of the precipitation tanks, with a fall of 3 inches to the 100 feet into the main channel, through which the sludge runs by gravitation into the sludge tank, which is under the sulphate of alumina room. This tank is 40 feet by 46 feet by 21 feet below the floor line. The liquid sludge is raised from this tank by a 6-inch centrifugal pump into three sludge setting tanks and allowed to precipitate. When 50 per cent. of the water is run off into the pump well, the precipitated sludge is then drawn from these tanks into a tank 46 feet by 40 feet by 23 feet below the floor line under the lime-mixing room. In the north-east corner there is a low-pressure sludge ram 29 feet below the floor line, capable of holding 1,800 gallons, through which the sludge is raised by compressed air into the two sludge mixers at the east wall of the lime-room. Here hot lime is added to the sludge to facilitate the pressing.

In the low floor of the sludge receiving room there are four high-pressed rams, each holding 900 gallons. The sludge runs from the mixers by gravitation through a 6-inch cast-iron pipe into these rams, from which it is raised by compressed air at 100 lbs. to the square inch

into the sludge presses. When this air has blown the sludge from the high-pressed rams, it is then transferred into the large low-pressed ram in the north-east corner of the sludge tank, thereby effecting a saving of fully 80 per cent. of compressed air, by raising sufficient sludge into the mixers to again re-charge the high-pressed rams. To duplicate the high-pressed rams there is a horizontal duplex pump, with 11-inch cylinder, 7½-inch pump, 10-inch stroke, capable of discharging 50 tons per hour of crude sludge against 100 lbs. pressure. This pump can draw direct from the sludge well or from the sludge mixers. The compressed air is made by two high-pressure engines to the north of the rams, where there is also a duplex steam pump for feeding the water into the boilers. To the south of the rams there is a bath-room for the employees.

In the press-room, on the top floor, there are 12 sludge presses, seven of which hold 25 cwts. each, and five 32 cwts. each, when fully charged, making a total of 16 tons 15 cwts. of pressed sludge cake each round of the presses. This sludge cake is dropped through shoots in the floor into the railway wagons, which are immediately underneath. By passing the pressed sludge cake through a patent drying machine, the moisture can be reduced to 15 per cent. It is then passed through a 7-foot pan mill with perforated bottom, prior to being filled into bags, or loaded direct by elevators into railway wagons. This product is called "Globe Fertilizer Sewage Manure."

In the boiler shed, to the north of the sludge receiving room, there are six 28-feet by 7-feet Lancashire boilers. The working pressure is 100 lbs. per square inch. The fuel used is coke and dross. At the south end of the boiler shed there is a Rowe's patent feed-water heater, into which the exhaust and waste steam is discharged, to heat the feed water before it passes into a Messrs. E. Green & Son's patent economiser, consisting of 320 cast-iron tubes. From this economiser the water is passed into the boilers at 250° Fah. North of the engine-room there is a workshop for doing the necessary repairs.

Returning to the sewage water as it enters the feed channels to the precipitation tanks at the north-east corner, it can be directed into either the eastern or the western feed channels to the tanks. There are four tanks, worked on the under-surface continuous-flow system. These combined have a surface area of 15,602 square yards, and a capacity of nearly five million gallons. It has been found that over five million gallons can be satisfactorily precipitated for every million gallons tank capacity. The effluent is discharged on to an aerating bed. There are also 18 intermittent precipitation tanks, each 100 feet by 50 feet, with a storage capacity of 34,200 gallons. These can also be worked on the under-surface continuous-flow system. The clear effluent is drawn off by water drainers. The sludge is drawn from the tanks by 12-inch disc valves into the 3-feet 3-inch underground channel, and flows into the sludge tanks as previously explained.

The water from the precipitation tanks passes in a 17-feet 6-inch channel leading to the filtering beds, which are on the west side of Swanston Street. Before crossing the street the water is passed over a "Messrs. Glenfield & Kennedy Water Gauge" with knife edge, which registers the quantity in gallons up to 30,000,000 per 24 hours. The water is syphoned through below the street in three cast-iron pipes, and

risers into a 20-foot main channel, from which there are four 5-foot channels branching off to distribute the water into the filters. There are twenty engine ash filters, each 40 feet by 10 feet by 3 feet 6 inches, and forty sand filters, each 40 feet by 38 feet by 2 feet 3 inches. The sand in these filters, when it becomes dirty on the top, is washed with precipitated sewage water, which flows by gravitation to the sand-washing machine, and thereafter the sand is used over and over again. In addition to the above filters, there is a land filter, one acre in extent, on which the effluent can be passed if required. The water then passes into the 20-foot effluent channel, thence through five flap valves into the outlet chamber, and finally into the River Clyde. The works, as they at present stand, deal with 16,000,000 gallons of sewage per day, or about one-fourth part of that of the entire city; but these works can be extended to treat twice that quantity. The area drained into these works is 3,796 acres, with a present population of 276,000. The buildings, railway sidings, tanks, and filtering beds cover an area of 19 acres out of 28 purchased and available. The land cost £35,462, and the building, tanks, and machinery an additional £101,257, equal to £136,719 in all.

The present method of disposing of the solid matter after filter-pressing is to load it direct into railway trucks and despatch to farmers throughout the country. During the past six years 76,478 tons have been disposed of in this manner, and 17,252 tons manufactured into "Globe Fertilizer" during the same period. The pressed sludge cake contains about 60 per cent., and the Globe Fertilizer about 16 per cent. of moisture. During seed time and harvest there is no demand for this class of manure. The pressed cake during these two seasons of the year has either to be stored or sent to the Corporation farms.

WESTERN DISTRICT WORKS.

The inauguration of the Dalmuir Sewage Purification Works signalises the completion of the major portion of the Glasgow Main Drainage Scheme, which, next to the undertaking of the London County Council, is the largest in the world.

The volume of sewage and rainfall which originates within the drainage area, and will be dealt with in the three separate works described, is estimated, on the ultimate development of the territory, at 254 million gallons per day.

The new works at Dalmuir, together with those already in operation at Dalmarnock, provide for the reception and treatment of more than one-half of this combined flow.

It may be confidently predicted that the unquestioned success that has characterised the treatment of sewage at Dalmarnock will be at least maintained, if it is not surpassed, at Dalmuir, and that an immediate pronounced improvement in the condition of the river will be made manifest, now that the new works are being brought into use.

The Main Drainage Scheme for the collection and treatment of the sewage of Glasgow and the adjacent local authorities was authorised by special statutes in 1891, 1896, 1898, 1901, and 1903. The territory included stretches along both sides of the River Clyde for a distance of about 15 miles, the superficial extent of the drainage area being

39 square miles. The territory is likely to be increased by the inclusion of areas belonging to outlying local authorities.

The drainage area is divided into three sections, each distinct from the others, with separate works for the disposal of their sewage.

The first of these, coloured blue on the map, authorised in 1891, and doubled in extent in 1901, comprises about 11 square miles, one-half being within the city, and the remainder in the landward district of the County of Lanark.

The works for the treatment and disposal of the sewage of this area are situated at Dalmarnock, and the sewage is collected and conveyed there by a main sewer constructed at the cost of the Caledonian Railway Company.

The second section, coloured yellow on the map, was authorised in 1896, and includes the municipal area on the north side of the river, not provided for in 1891, the Burghs of Partick and Clydebank, and intervening parts of the Counties of Renfrew and Dumbarton, the whole extent being 14 square miles.

The works for the disposal of the sewage derived from this area are situated on the river bank at Dalmuir, about 7 miles below Glasgow.

The third section, coloured red on the map, authorised in 1898, comprises the whole of the municipal area on the south bank of the river, the Burghs of Rutherglen, Pollokshaws, Kinning Park, and Govan, as well as various residential and rural districts in the Counties of Lanark and Renfrew. The extent of this section is 14 square miles.

The works for the disposal of the sewage of this area were originally intended to be situated on the river bank at Braehead, about 1 mile eastward from Renfrew. It has recently been found that this position would be disadvantageous to the Trustees of the Clyde Navigation, and it has now been arranged to place the works at Shieldhall. Application has been made to Parliament for authorisation of the change.

The different works authorised by the Statutes of 1891, 1896, and 1898 are regarded as one undertaking.

The collecting and intercepting sewers which connect with the Dalmarnock Works have all been constructed, and in successful operation since May, 1894.

The daily volume of dry-weather sewage treated there at the present time is about 16 million gallons, which will ultimately be increased to 20 million gallons.

The daily volume of dry-weather sewage to be ultimately treated at Dalmuir is 49 million gallons, and the corresponding volume at Shieldhall will be 48 million gallons.

For the collection and disposal of the 97 million gallons of sewage within this divided territory there will be constructed 30 miles of sewers, varying in size from 2 feet 6 inches in diameter to 10 feet. In addition to the daily dry-weather flow of sewage, an amount of rainfall equivalent to one-quarter of an inch per day will be admitted into the sewers, making a total of 214 million gallons of combined discharge.

The principal features of the Western Scheme are the construction of an outfall sewer to convey the drainage of the higher levels of Glasgow and Partick to the works at Dalmuir; the construction of an intercepting sewer to collect the drainage of the lower levels of the city; the con-

E.



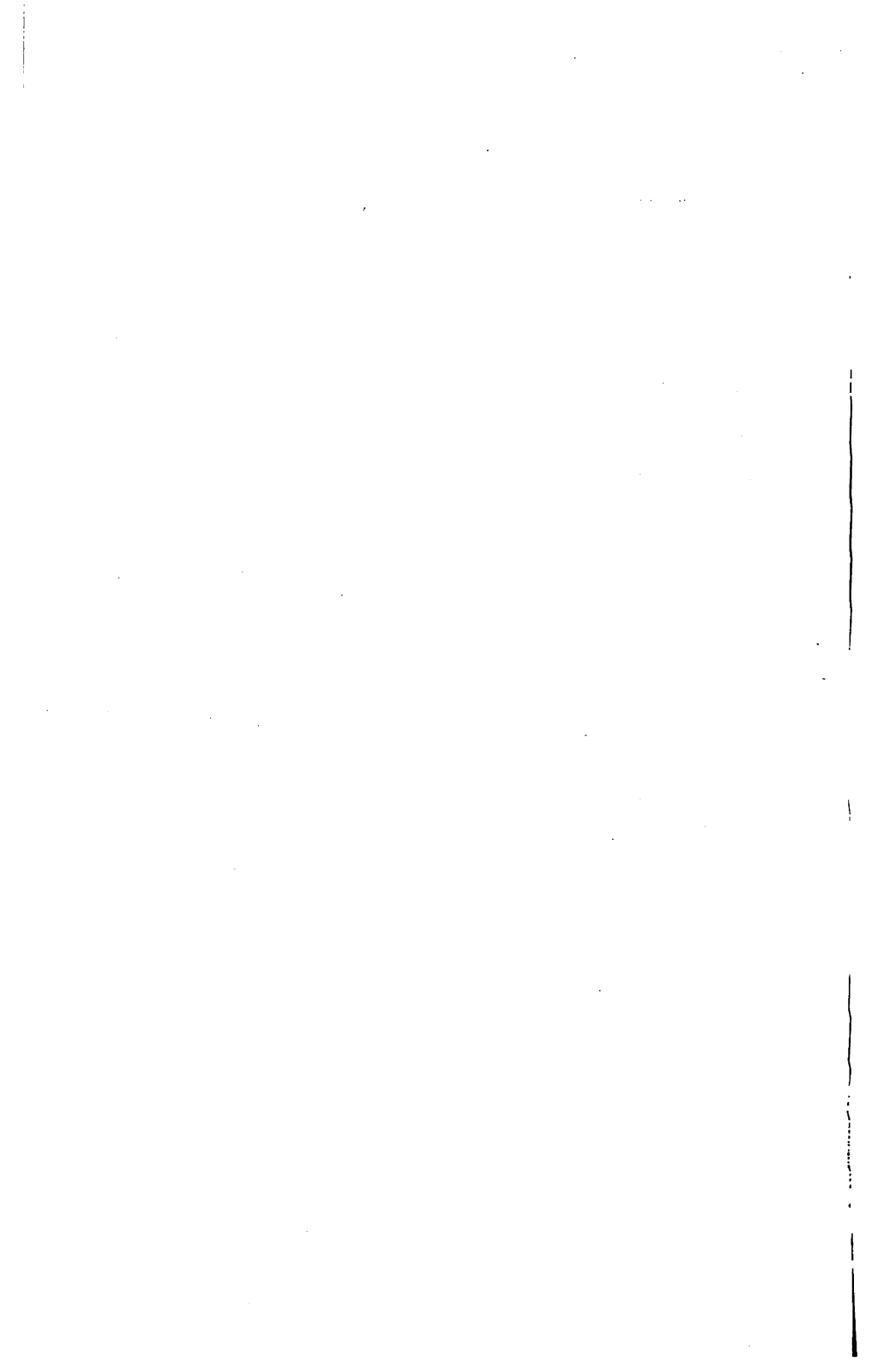
HARF, DALMUIR.



G E.



AUIR.



struction of an intercepting sewer to collect the drainage of the lower levels of the Burgh of Partick; and a third intercepting sewer to convey to the Dalmuir Works the drainage of the Burgh of Clydebank.

The levels of the Partick and Clydebank intercepting sewers are sufficiently depressed to admit the drainage of the Upper District of Renfrewshire, situated to the west of Glasgow and Partick and to the east of Clydebank, and negotiations are in progress for adjusting the terms for the inclusion of that territory within the Main Drainage Scheme, in accordance with the provisions of the Sewage Acts.

The Glasgow and Partick intercepting sewers will be pumped into the outfall sewer at Partick Bridge, the lift being 37 feet. The pumping engines, three in number, are of the triple-expansion inverted marine type, with plunger pumps, each capable of raising 11,250 gallons per minute, or 16 million gallons per day. Steam is supplied to these engines by four boilers, working at a pressure of 160 lbs. per square inch.

The sewage from the Clydebank intercepting sewer will be pumped at Dalmuir, the lift being 21 feet. The smaller engines at Dalmuir will be of the centrifugal type, and power for the sewage treatment plant will be transmitted by electricity.

Rather more than one-half of the total sewage of the Western Scheme will be carried without pumping to the Dalmuir Works, where the whole contents of the outfall sewer will be delivered into the precipitation tanks above tidal level. The sewage conveyed by the main outfall flows directly into a catchpit, passing through screens that will intercept the detritus and such floating matter as can be disposed of without passing through the precipitation tanks. The low-level sewage from Clydebank will also be screened before it is pumped into the catchpit. Within the catchpit, which is 156 feet long, 24 feet wide, and 18 feet deep, the sewage will be agitated by a travelling dredger and receive its proportion of chemical treatment before it passes out through the feed channels into the precipitation tanks. These, as shown on the annexed plan, are six in number, with provision for the future addition of other two, and have an average length of about 750 feet. They will be worked in series on the principle of under-surface continuous flow. The purified effluent from the tanks will pass by gravitation over a discharge weir into the river, and the precipitated sludge will be pumped into the tanks shown on the plan, and delivered at arranged intervals to specially constructed barges and conveyed to sea.

The general arrangement of the Dalmuir Sewage Works will be understood by reference to the annexed plan and photographs.

On the south bank of the river the surface levels of the drainage area are less favourable for the conveyance of sewage and rainfall by gravitation than they are on the north side, dealing with the figures that represent the distribution of population at the present time, although the future development of the territory included will bring the volumes conveyed by the gravitation and pumped sewers into less disparity. A storm-water relief sewer will require to be constructed in Kingston District to discharge the rainfall carried by the outfall sewer in excess of one-quarter of an inch per day.

The sewers to be constructed on the south side of the river follow for the greater part of their course the line of public streets and roads.

There will be a pumping station at Kinning Park, where the low-level sewage will be raised 19 feet and forced an additional height of 17 feet up a rising main into the outfall sewer. A second pumping station is required at Shieldhall, where the lift is to be 21 feet.

The works for the treatment of the Southern sewage at Shieldhall will, like those of Dalmuir, have the great advantage of river frontage, with every facility of water carriage for receiving and despatching materials.

The system of sewage treatment which is now adopted at Dalmarnock is chemical precipitation by means of under-surface continuous flow. The drainage received at the works is of a complex and specially intractable character, consisting, for the most part, of industrial refuse, charged with suspended matters that vary from 20 to 1,000 grains per gallon. The treatment of such sewage is a matter of no ordinary difficulty, and the proportion of the chemical ingredients undergoes frequent change during the day.

After careful deliberation, and much patient investigation on the part of the Sewage Committee and their advisers, it was resolved to adopt at Dalmuir and Shieldhall the same method of sewage treatment as that which has, for the last seven years, been in successful use at Dalmarnock, with this exception that the sludge presses, which by the compulsion of the situation at Dalmarnock Works, have been employed there, are to be dispensed with, and the liquid sludge, as already explained, carried out to sea.

The most diligent enquiry regarding the methods adopted by other authorities in England failed to provide the Sewage Committee with any reason to justify them departing from what they regard as a securely ascertained and efficient system of sewage precipitation and disposal.

The installation of an experimental plant for the bacterial treatment of sewage at Dalmarnock gave satisfactory results, but also corroborated the information which the Committee already possessed as to the disproportionate cost of this method of sewage disposal.

The sewage treatment in daily practice at Dalmarnock obliterates every trace of suspended matter, and effects 30 per cent. of chemical purification, calculated on the basis of oxygen absorbed in four hours at 27 degrees Centigrade. The result may leave something to be desired, but it must be borne in mind that economy imposes a limit on achievement in this direction. The quantity of sewage disposed at Dalmarnock at the present time is, as we have seen, about 16,000,000 gallons, and it is discharged into a tidal stream of fiftyfold volume.

It has not yet been ascertained by any scientific authority what degree of saturation is needed to secure innocuous conditions in the admission of sewage effluent into flowing water, but it may be safely asserted that there is in this case as near an approach to the complete elimination of every element of objection as could be wished for. Further down the river, at Shieldhall and at Dalmuir, the 97,000,000 gallons of purified sewage will come in contact with 3,000,000,000 gallons of tidal water, and natural agencies may with safety be left to effect the final purification and oxidation of the effluent, the more especially as the sewage to be dealt with on these lower reaches of the river is of a simpler character than that which is presently treated at Dalmarnock, and consequently is likely to yield an effluent of a better character.

There is the greater reason to expect this, as the form and dimensions of the precipitating plant at Dalmuir and Shieldhall will be more effective than the original installation at Dalmarnock.

The latter works were designed by the late Mr. G. V. Alsing, and were justly regarded at the time of their construction as creditable in the highest degree to their designer, embodying, as they then did, the latest results of experience and scientific research. They were arranged for intermittent precipitation, and worked in connection with coke filters, through which the sewage effluent was passed on its way to the river.

More recently it has been found desirable to extend and convert the Dalmarnock Works; the precipitation tanks are now worked on the principle of under-surface continuous flow, and the use of the filters has been abandoned, as it was found that the process deteriorated the effluent instead of improving it.

The precipitation tanks at Dalmuir, which are to be worked on the system of under-surface continuous flow, are more favourably situated than those at Dalmarnock, each being, as already stated, about 750 feet in length, thus allowing opportunity for more complete precipitation than is afforded in the shorter tanks at the Dalmarnock Works, and effecting a saving in the reduced proportion of chemical agents required for the process.

The works authorised under the Statutes of 1896 and 1898 include, as already stated, 30 miles of outfall and intercepting sewers, as well as four separate pumping stations, and two sewage works for the treatment of the collected drainage—one at Dalmuir, the other at Braehead, now proposed to be placed at Shieldhall.

A glance at the map appended to this memorandum will show the extent of the completed work, indicated in black delineation, as contrasted with the works which have yet to be carried out, which are coloured red.

It was found necessary to make application to Parliament during last Session for authority to deviate one of the sewers authorised in 1898, to alter the site of the Southern Pumping Station, and to increase the borrowing powers. The measure was opposed by a number of petitioners, but the Commissioners, at the local enquiry, found the preamble of the Order proved, with very slight modification, and the measure received the Royal Assent on the 11th August, 1903.

In the exercise of the powers thus obtained, the details of the various sewers have been elaborated, specifications and forms of tender prepared, and other arrangements made for carrying out the several important works included in the Southern Main Drainage Scheme, but, as already narrated, the whole operations are held in abeyance pending the result of the present application for authority to alter the site of the Sewage Station from Braehead to Shieldhall.

At the Partick Pumping Station, situated at the Dumbarton Road Bridge over the Kelvin, the sewage will be taken from the low-level sewers and lifted into the main outfall sewer, whence it will flow by gravity to the purification works at Dalmuir.

Entering the south side of the station from the low-level sewers, the sewage flows into the penstock (or valve) well. Here the rough screens bar the passage of any of the larger floating solids, while, in the screen-

house beyond, the fine screens, with continuous scrapers, remove some of the smaller matter, which might tend to interfere with the working of the pumps. From the screen-house the sewage is distributed to the several pump-wells.

In the pump-house, provision has been made for four similar pumping engines, three of which are now being installed. Each unit consists of one vertical triple-compound three-crank surface-condensing direct-acting plunger pumping engine, and, when running at the normal speed of 20 revolutions per minute, is capable of raising 16,200,000 gallons of sewage in twenty-four hours through the mean lift of 36 feet.

The soles of the main pumps are 42 feet below the level of the street, and the engine floor is about 10 feet below street level.

On the pump floor, in addition to the three main pumps, are small auxiliary pumps for the drainage of the pump-wells.

On the intermediate floor are the main pump discharge pipes, in which are formed the surface condensers, the pumped sewage being used as circulating water. The condenser air pumps and other auxiliary pumps are also placed on this floor.

The accompanying illustration shows the engines erected in contractors' shops, and will serve to show how the engines will appear above the engine floor, though it does not give a complete view of a pumping unit.

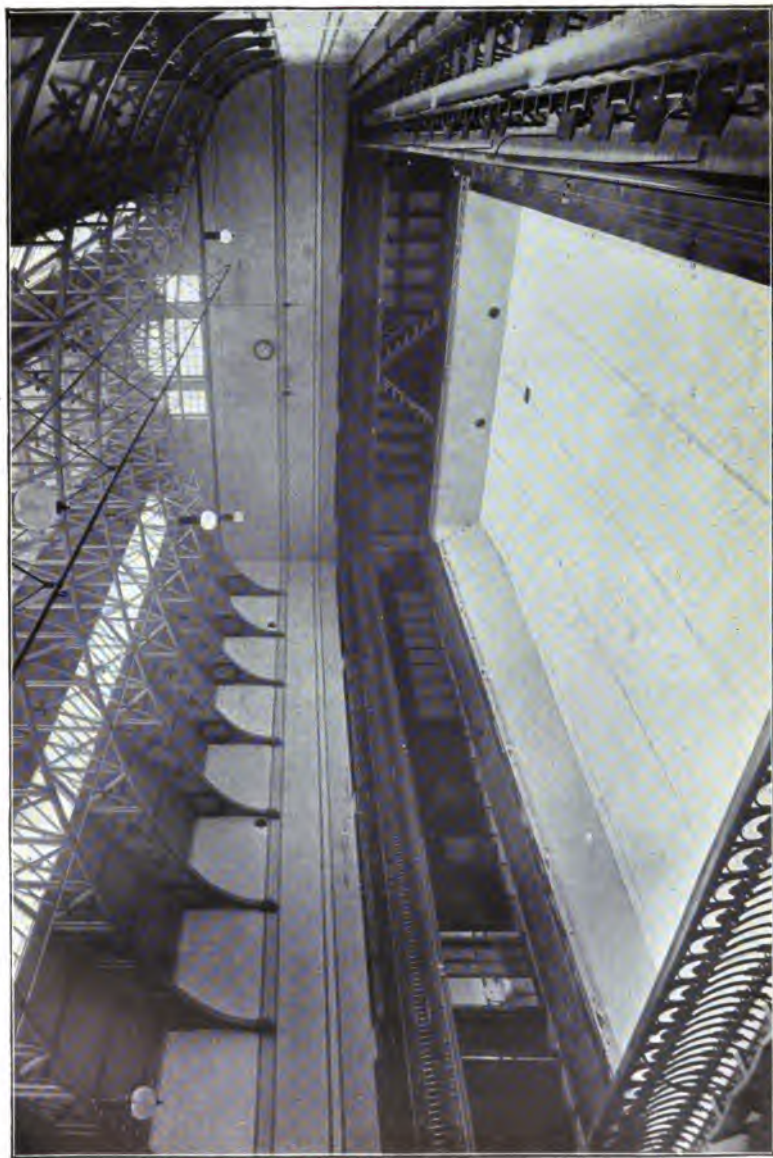
In the boiler-house, to the west of the screen-house, space has been set aside for six boilers, but at present there will only be put down four Galloway boilers, 26 feet long, 7 feet diameter, for 160 lbs. per square inch working pressure, also a 240-tube Green's fuel economiser. Mechanical stokers, which will receive coal from the store overhead, will be fitted to all boilers.

To the west of the pump-house, and at the level of the intermediate floor, is the auxiliary engine-room, in which will be placed two small vertical triple-compound three-crank surface-producing engines, each capable of driving the whole of the line shafting, screening, and elevating machinery, economiser scrapers, stoking plant, power travelling crane in pump-house, tools in workshop, and all other power which may have to be transmitted from the line-shafting. In this room are also housed the Weir pumps for boiler feeding, the feed-collecting tank, and the feed-water filters.

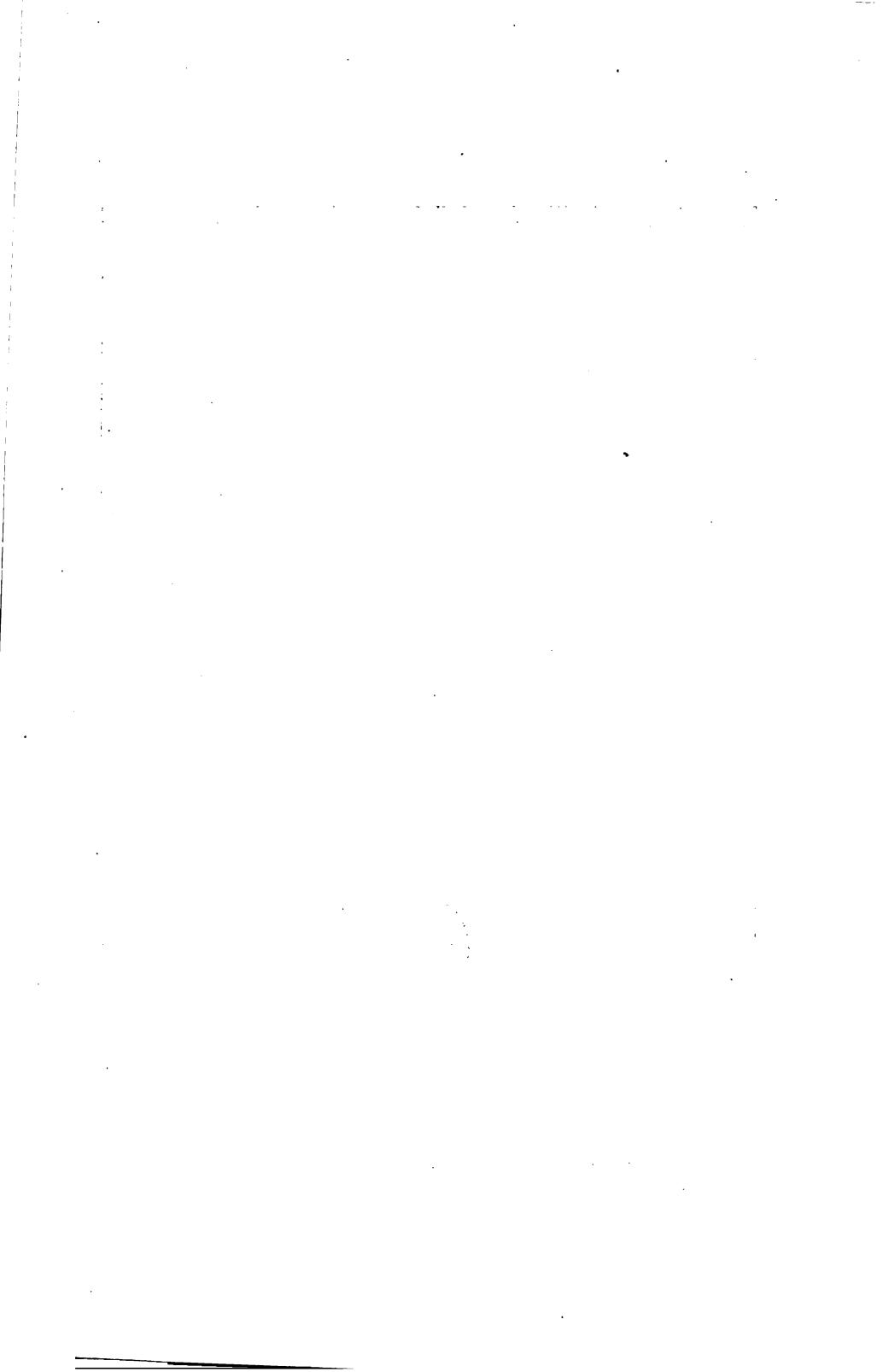
BATHS AND WASH-HOUSES.

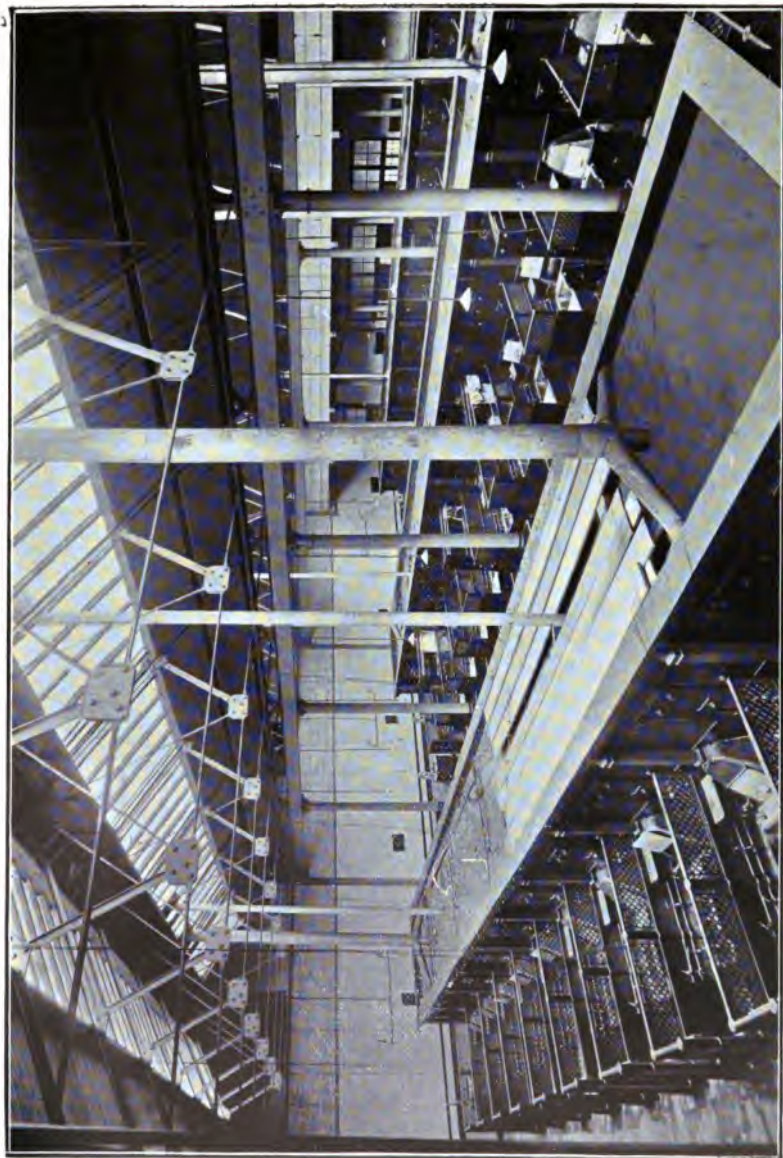
THE initial steps towards the establishment of Public Baths and Wash-houses were taken in the year 1869, when the Town Council approved of the following motion, viz.:—"That it be an instruction from this Board to the Sanitary Committee that they shall forthwith provide, at four of the most suitable points of the city, public baths and wash-houses for the accommodation of the inhabitants." Nine years afterwards (1878) the first of the present establishments was opened.

The following table of facilities gives the dates upon which the various baths and wash-houses were opened.

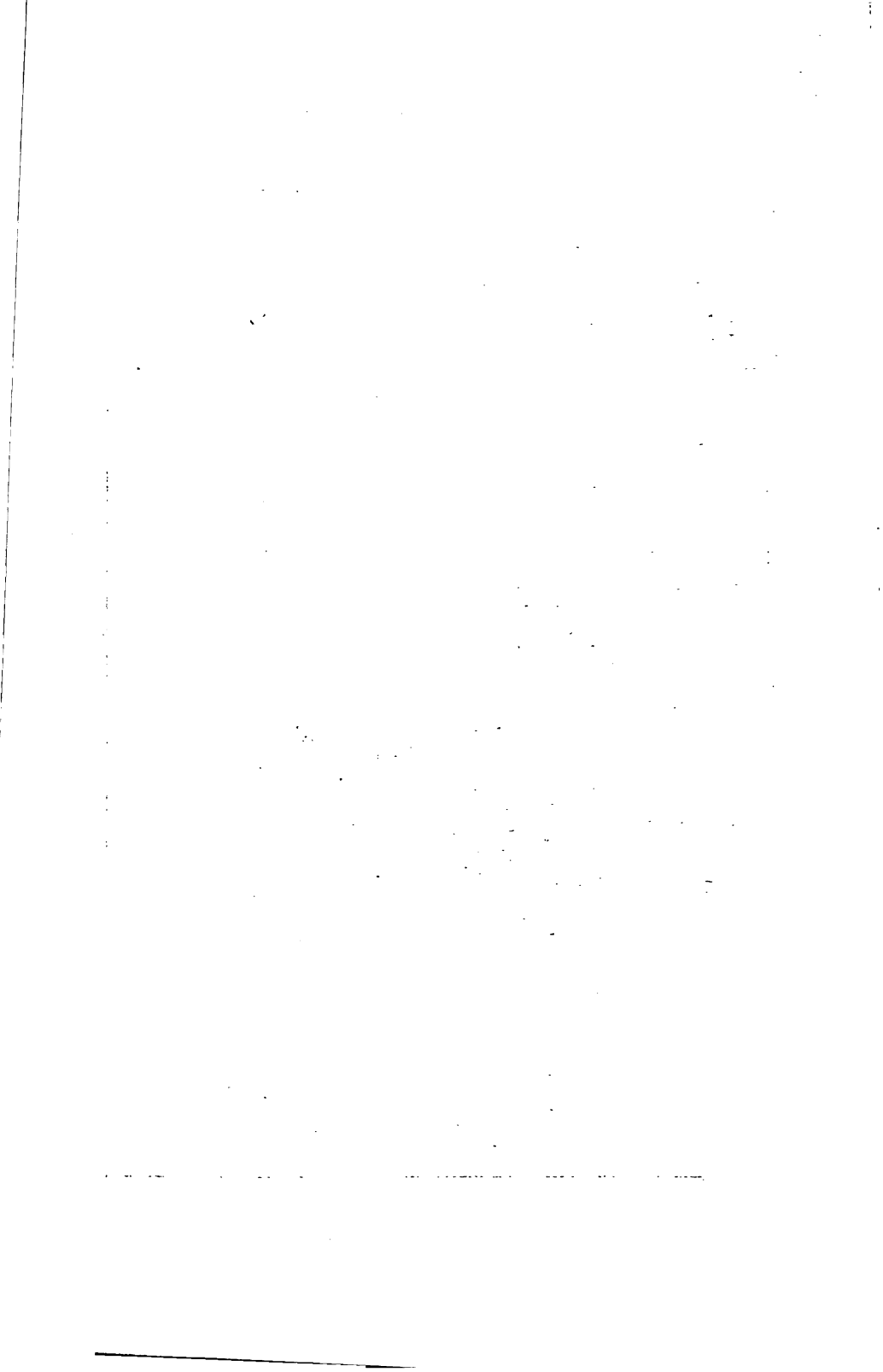


WHITEVALE BATHS.—SWIMMING POND.





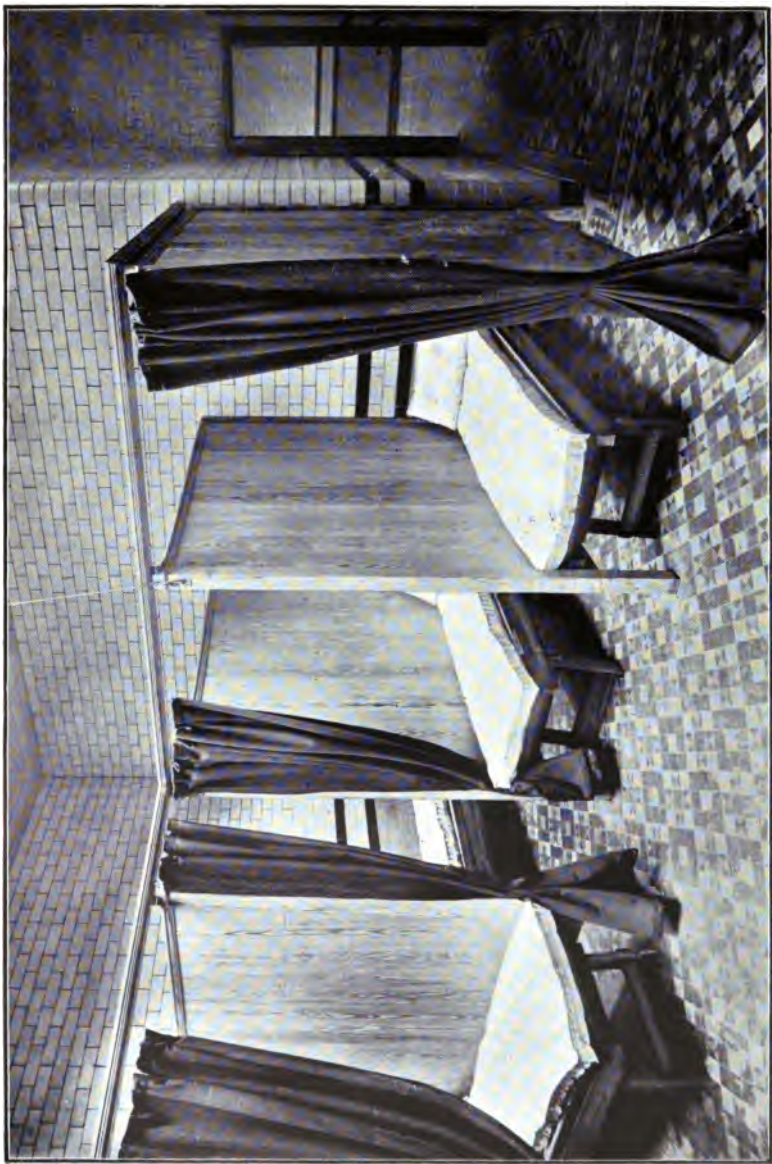
WHITEVALE WASH-HOUSE.



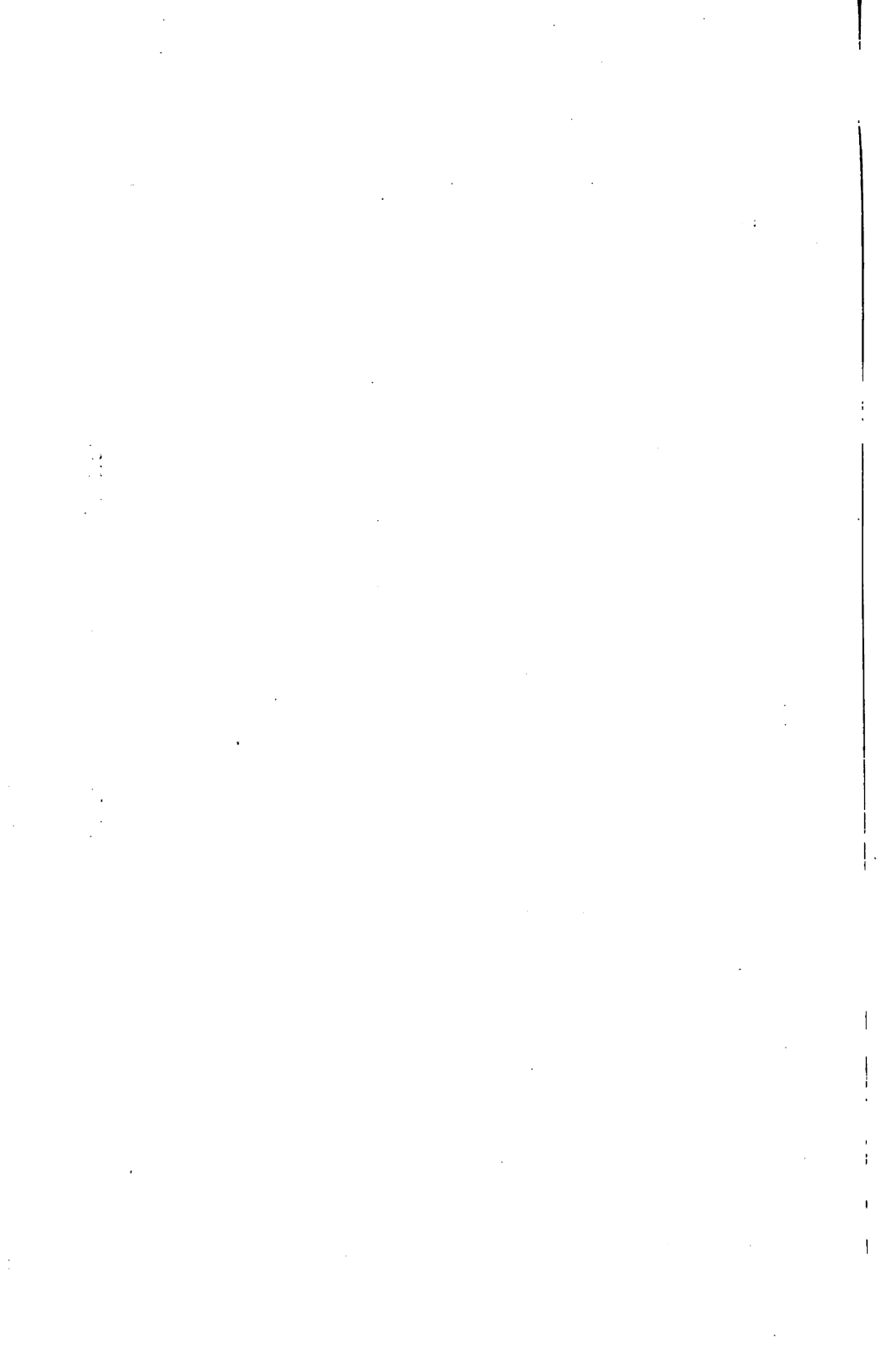


WHITEVALE BATHS.—HOT BATHS.





WHITEVALE BATHS.—TURKISH BATHS.



Ground has also been acquired for the erection of other two establishments of about the same size as that last erected (Dalmarnock). £232,232 is the amount of capital expenditure in the department up till the year 1903.

For the financial year ending 31st May, 1903, the total ordinary expenditure, including interest (£7,013), amounted to £23,000, and the total revenue to £15,268. The attendances for the same year were—

Swimming ponds,	...	...	...	...	407,956
Hot baths,	...	...	...	...	237,218
Wash-houses,	...	...	...	...	432,168
Making a total of	...	...	...	...	<u>1,077,342</u>

FACILITIES.

	Opened.	Swimming Pond for Men and Boys.	Swimming Pond for Ladies and Boys on certain days.	Number of Private Baths for Men.	Number of Private Baths for Women.	Wash-houses. Number of Washing Stalls.	Cost.
		Length. Width.	Length. Width.				
Greenhead, -	1878	75' by 40'	35' by 25'	28	4	40	£17,190
North Woodside, -	1882	75' by 40'	40' by 24'	27	7	67	18,757
Cranstonhill, -	1883	78' 6" by 42' 6"	52' by 28'	34	6	73	24,910
Townhead, -	1884	75' by 40'	44' by 28'	27	6	70	28,585
Gorbals, -	1885	75' by 39'	38' by 21'	26	6	54	34,400
					*and Kosher		
Hutchesontown, -	1897	None	None	10	4	70	8,012
Springburn, -	1898	75' by 35'	None	28	5	34	20,614
Maryhill, -	1898	75' by 35'	None	28	4	36	17,048
Kennedy Street, -	1899	None	None	None	None	50	5,815
Stobcross, -	1899	None	None	None	None	56	6,411
Bain Square, -	1900	None	None	None	None	44	5,469
+Whitevale, -	1902	75' by 40'	50' by 25'	40	8	66	38,000
Dalmarnock, -	1904	None	None	22	2	56	...
Total Number, -	...	8	6	270	52	716	...

* The Kosher bath-room at Gorbals, the only one belonging to the Corporation, contains four ordinary slipper baths, fitted with cloth screens, in addition to a wooden vessel measuring about 6 by 3 by 4 feet deep. This arrangement was made to meet the requirements of the Jewish community.

† Twelve of the baths for men at this establishment are spray. It has also a gymnasium 42 feet by 24 feet, and a Turkish bath, having accommodation for 8 bathers.

OFFICE OF PUBLIC WORKS.

(a) MASTER OF WORKS.

THE Master of Works has charge of the public roads, bridges, sewers, and public conveniences, and is responsible for the carrying out of the provisions of the Police Acts for securing the safety, health, and comfort of the citizens in connection with the construction, alteration, and repair of buildings, private streets, pavements, courts, ashpits, and other works, the maintenance of which devolves upon proprietors. Along with other officers, he requires to inspect all factories, workshops, theatres, and music halls, and also the buildings requiring to be licensed under the Petroleum Acts.

ROADS.

The city roads are divided into two classes—(1) public streets, maintained by public assessment; and (2) private streets, maintained by proprietors whose property has a frontage thereto.

The public streets, previous to 1843, were, with a few exceptions, paved with rough whinstone, irregular blocks, or cobble, the exception being the principal or main thoroughfares—thirteen in number—which, for facility of traffic, were partly paved with square-dressed whinstone setts, 4 to 6 inches broad and 8 inches deep, laid on a thick bed of sand, the other parts of those streets being paved with the rough blocks referred to. In 1838 a small portion of Jamaica Street was paved with granite setts from Inveraray quarries, and at the same time the rest of the street was paved with whinstone. Six years later it was found that, while the whinstone was much worn, the granite setts were as good as when first laid. According to a report made in 1844 by Mr. Carrick, the then Master of Works, it was calculated that at the end of twenty years the cost of whin paving, including repairs made during that period, would slightly exceed the cost of granite, and that, while the former material would be worn out and be unfit for relaying, the latter, with a slight re-dressing, would be practically as good as when first laid. The adoption of granite as a paving material for the principal streets was accordingly resolved upon, whinstone being used in streets where the traffic was light. Since that period portions of the rough rubble causeway have, year by year, been lifted and replaced with square-dressed stones. For some years past the streets have, as a general rule, had a foundation of Portland cement concrete 4 to 6 inches deep, and the joints of the setts are grouted with Portland cement or coal-tar pitch, whereas formerly the joints were grouted with sand, although occasionally lime was used.

The expenditure on the paving of public streets with square-dressed blocks has been as follows:—

	Granite Paving.					Whin Paving.			
From 1844 to 1876, ...	£300,348	15	9	...	£33,524	9	9		
From 1877 to 1903, ...	294,514	11	10	...	164,936	1	10		
	<hr/>					<hr/>			
	£594,863	7	7	...	£198,490	11	7		
	<hr/>					<hr/>			

—a total of £793,323 19s. 2d., exclusive of the sums expended by the Corporation Tramways Department.

Since 1897 the Corporation, influenced by the necessity of providing, in important business thoroughfares of the city, a noiseless paving which would also admit of rapid and complete cleansing of the surfaces, have lifted the stone setts in several streets, and substituted various kinds of asphalt. Those asphaltes and the areas covered by each up to the end of May, 1903, are as follows:—

					Square Yards.
Alcatraz asphalt, ...	...	...	...	...	43,174
Limmer „	...	...	...	...	14,021
Seyssel „	...	...	...	...	2,283
Trinidad „	...	...	...	...	920
Mixture of Seyssel and Trinidad,...	...	...	...	...	1,348

In streets of comparatively light traffic tar-macadam paving has also been adopted as a smooth paving, the area paved with it being 39,736 square yards. Difficulty is experienced in keeping asphaltes in repair alongside of tramway rails. Tar-macadam is only suitable in streets of light traffic.

Wood paving has been in use to a limited extent for a considerable number of years. Experience has shown that soft woods rapidly wear out under the influence of our moist climate and the tear and wear caused by the shoes of horses, the mode of shoeing adopted for the horses in the city being very detrimental to this class of paving. The only woods which have given any satisfaction are the hard woods from Burmah (Pynkadoe) and Australia (Jarrah).

At 31st May, 1903, the length of streets paved with smooth paving was 6 miles 27 yards.

In the autumn of 1902 a deputation appointed by the Statute Labour Committee with the approval of the Corporation, having visited various cities and made a thorough investigation regarding the paving of streets therein, prepared and submitted a report in which they made a large number of recommendations, including one that there should be a considerable extension of smooth paving in the city, and especially with asphalt, where the conditions would allow of that class of work. During the year ending 31st May, 1904, the Corporation authorised the expenditure of £10,000 on smooth paving.

In regard to cost and durability, granite stands far ahead of all other materials. Its principal disadvantage—that of noisiness—is common to all stone pavings in a greater or lesser degree.

The rate of assessment for the maintenance of roads and bridges, and providing for a sinking fund of 5 per cent. for permanent paving and 2 per cent. for bridges, is at present $5\frac{1}{16}$ d. per £ on rental—one-half payable by the proprietor and one-half by the tenant. This assessment provided the sum of £102,475 15s. 7d. for the year ending 31st May, 1904. The length of the public streets is $220\frac{1}{2}$ miles, of which 112 miles are macadamised.

BRIDGES.

The bridges forming part of the city roads are maintained out of the assessment for the upkeep of roads and bridges, and are as undernoted:—

Road and Foot Bridges over the River Clyde.

		Opened.	Width.	Cost.
Rutherglen Bridge, ...	Stone,	7th August, 1896, ...	60 feet,	£75,547
Dalmarnock Road Bridge,	Iron,	6th May, 1891, ...	50 "	30,500
Polmadie Foot Bridge, ...	Wood,	13th June, 1901, ...	16 "	4,198
Govan Street Bridge, ...	"	13th June, 1901, ...	50 "	10,076
M'Neil Street Suspension Bridge, ...	—	1856, ...	13 "	6,348
Albert Bridge, ...	Iron,	21st June, 1871, ...	60 "	62,328
Victoria Bridge, ...	Stone,	1st January, 1854, ...	58 "	46,206
*Portland Street Suspension Bridge, ...	—	1853, ...	14 "	9,083
Glasgow Bridge, ...	Stone,	24th June, 1899, ...	80 "	129,500

* Taken over from proprietors at £9,083. Further sum of £6,836 spent shortly afterwards on extensive repairs, including service bridge.

Road and Foot Bridges over the River Kelvin.

		Opened.	Width.	Cost.
Canniesburn Road, ...	Stone,	—	25 feet,	—
Bridge Street, Maryhill, ...	"	—	24 "	—
Kelvindale Road Bridge, ...	"	—	18 "	—
Kirklee Bridge, ...	"	13th June, 1901, ...	60 "	£29,654
Foot Bridge at Ford Road, ...	Wood,	July, 1886, ...	7 "	—
Queen Margaret Bridge, ...	Iron,	1870, ...	34 "	—
Belmont Bridge, ...	"	1870, ...	40 "	—
Great Western Rd. Bridge, ...	"	29th September, 1891, ...	60 "	51,878
Woodlands Road Bridge, ...	"	1895, ...	60 "	—
Dumbarton Road Bridge, ...	"	1877, ...	60 "	—
Old Dumbarton Rd. Bridge, ...	"	1896, ...	50 "	—

Bridges over Canal.

		Opened.	Width.	Cost.
Castle Street, ...	Stone,	—	60 feet,	—
Garngad Road, ...	"	—	50 "	—
Millburn Street, ...	Iron,	—	50 "	£2,431

Bridges over the River Cart.

		Opened.	Width.	Cost.
Millbrae Bridge,	Stone,	20th January, 1899, ...	50 feet,	£5,465
Bridge at Cathcart,	„	7th August, 1902, ...	60 „	13,012

SEWERS.

The sewers for the general drainage of the streets and buildings abutting on same are of two kinds—(1) public sewers, for the drainage of public streets, the cost of the construction of which is paid for by the proprietors up to a size equal to that of a circular sewer 3 feet in diameter—the extra cost of any size above this is paid for by the city; (2) private sewers, for the drainage of private streets, the cost and maintenance of which are paid by the proprietors of property fronting the street. The length of public sewers in the city constructed previous to 1849 was 40 miles. The length constructed between 1849 and 1876 was 48½ miles, costing £111,216; and between 1876 and 1902, 41½ miles, costing £215,830.

The cost of the maintenance and repair of the public sewers and street gratings is about £13,000 per annum.

WORKMEN.

The staff of workmen employed in the maintenance and repair of streets and sewers numbers 407 in all.

CONTRACTS.

All new pavior work, extensive renewals, and the construction of new sewers are done by contracts. The pavior work contracts extend from three to five years. All materials are supplied under yearly contracts, with the exception of granite and whin setts, the contracts for the supply of which extend from three to seven years. Separate contracts are entered into for the construction of each sewer.

PUBLIC SAFETY, HEALTH, AND COMFORT.

The duty of the inspecting staff is to visit their districts and ascertain and note any defects in footpaths, streets, courts, drains, ashpits, washing-houses, or in the structure of buildings. When defects are found, notices are issued to the parties responsible, requiring them to make good such defects. Parties not complying with the requirements of such notices within the time specified for the execution of the works may be proceeded against, as provided in the Police Acts. The number of such

notices issued to proprietors during the year ending 31st May, 1903, was as follows:—

For repairs on streets,	841
„ footpaths,	2,429
„ drains,	692
„ wash-houses,	80
„ out-houses,	2,285
„ buildings,	426
„ areas and back courts,	279
Total,	<u>7,032</u>

DEAN OF GUILD COURT.

This Court was instituted in 1605 under a Letter of Guildry, its power from that date till 1862 being principally, so far as the structure of the city was concerned, confined to the securing of the proper lining of the streets and the protection of the rights of adjoining proprietors in regard to boundary lines, &c. The necessity for acquiring powers to regulate the laying out of new streets and securing that these should be of adequate width, for the securing of sufficient air space in front of and behind buildings, for regulating the minimum capacity of dwelling-houses, for securing proper drainage and sanitary necessities, &c., resulted in an application being made to Parliament for additional powers, and in the passing of the Glasgow Police Act of 1862, under which authority was granted to the Dean of Guild to enforce the carrying out of provisions necessary for the public safety and health in connection with the erection of new and the alteration of old buildings. These powers and provisions have, by the passing of the Police Acts of 1866, 1890, and 1900, been largely extended.

Under the Police Act as at present in force, application for authority to erect a new or alter an old building must be lodged with the Dean of Guild, accompanied by complete and detailed plans of the intended operations. The Master of Works is called as a party in every case in the public interest, and the plans are carefully examined by him to see that the requirements of the Acts are complied with previous to warrant authorising operations being issued by the Dean. The works so sanctioned are periodically examined by the inspectors of the Master of Works, and, when completed in accordance with the plans, he reports to the Dean of Guild that they have been so completed, and the Dean then sanctions the occupation of the building. Cases of non-compliance with the requirements of the Acts are reported to the Procurator-Fiscal to the Dean of Guild Court, and proceedings may be taken against the offending parties in terms of the Acts. The total number of linings granted by the Dean of Guild Court in 1876 was 636, and in 1903, 601.

AREA OF THE CITY.

Since 1876 the area of Glasgow has been more than doubled, and it may be of interest to show how the area of the city has been extended from time to time.



TIDAL WEIR, GLASGOW GREEN.—OPEN.

The ancient royalty, the charter of which was granted in—

1636—Contained	...	...	...	1,768	acres.
There were added in—					
1800—Part of Glasgow Green and part of the present centre of the city, between Ramshorn Church and St. Enoch's Burn,	...	...	...	96	"
1830—The area between St. Enoch's Burn and the burgh of Anderston,	...	...	...	296	"
1843—The Necropolis and the portion of the city between Castle Street and Garscube Road, south of the Canal,	...	...	...	213	"
1846—Areas including the burghs of Anderston, Calton, Gorbals, and portions of the counties adjoining, making the municipal boundaries correspond with the parliamentary boundaries,	...	...	...	3,418	"
1872—Areas including Glasgow University, Hundred Acre Hill, and part of Alexandra Park, &c.,	...	...	...	242	"
NOTE.—A portion of the ancient royalty in the Springburn district was also added to the municipal boundary at this time.					
1878—Coplawhill,	...	...	...	78	"
1891—Burghs of Maryhill, Hillhead, Govanhill, Crosshill, Pollokshields (West and East), Kelvinside, and portions of County of Lanark, and extensions at Belvidere, &c.,	...	...	...	5,750	"
1896—Bellahouston Park, &c.,	...	...	...	540	"
1899—Blackhill and Shawfield areas,	...	...	...	377	"

Making total area of municipality now, 12,688 acres.

(b) ENGINEERING AND ARCHITECTURE.

THE work carried on in the office of the City Engineer is of a complex and important character, and includes not merely the design and construction of such works as fall within the ordinary practice of a civil engineer, but a large amount of architectural work as well. Apart from this, the City Engineer is required from time to time to advise with the numerous committees of the Town Council regarding the various matters that engage their attention. These embrace a range of subjects too wide

to enumerate, extending, as they do, from the intricate public interests that influence the policy of the Corporation in their Parliamentary business to the adjustment of the details of a royal pageant. Intermediately the duty devolves on him of valuing the heritable estates of the Corporation, and deciding, under the provisions of a special statute, the terms on which property may be transferred from one department of the public service to another.

The engineering work in itself is extensive and important, comprising the preparation of Parliamentary plans and sections for deposit, and the compilation of large wall maps for use in the Committee Rooms of Parliament, whether the action of the Corporation be the promotion or the opposition of private Bills. There is also the duty of aiding in the preparation of cases for submission to Parliament, and the attendance to give evidence before the respective Committees of the Lords and Commons.

The revision of the Ordnance Survey of the city likewise falls under his charge, as does also the professional work necessary to the preparation of plans for the development and realisation of the lands belonging to the several departments of the Corporation, and the construction of the streets, sewers, and other works required for these purposes.

The construction and repair of the river embankments above the harbour involve large expenditure, and for their more effectual protection a tidal weir, equipped with movable sluices, each 80 feet wide, was formally opened on 28th December, 1901. This complex and most difficult undertaking was carried out according to a plan suggested by Sir Benjamin Baker, K.C.M.G. The work occupied a longer time than was anticipated, mainly on account of the character of the river bed, below which the foundations of the weir had to be constructed, under air pressure, in concrete, enclosed in steel caissons, 30 feet deep, which form a curtain wall extending from the northern to the southern bank of the river, to provide a rest for the mid-stream piers and the sills of the three sluices. The work was originally estimated at £70,000, but various modifications of the design, attributable to obstructions that could not have been foreseen, have added considerably to the cost.

The principal undertaking entrusted to the department of the City Engineer is the scheme for completing the main drainage of Glasgow and the adjacent Local Authorities. Authorised by Parliament in 1891, 1896, 1898, 1901, and 1903, this great undertaking, whose dimensions exceed those of any similar work outside of the Metropolis, involves the construction of thirty miles of sewers, varying in size from 3 feet to 10 feet diameter, by which the drainage of the city and the adjacent districts will be conveyed to separate sewage disposal works on the right and left banks of the River Clyde. The sewage derived from the right bank is conveyed to Dalmuir, about seven miles west of the River Kelvin, and the sewage collected on the left bank was originally meant to be treated at Braehead, on a site about a mile eastward of the Burgh of Renfrew, but it is now proposed to adopt the site of Shieldhall, somewhat nearer the city, in order to meet the requirements of the Clyde Trustees.

The drainage on either side of the river will be conveyed partly in outfall sewers of large capacity, which will deliver their contents by



TIDAL WEIR, GLASGOW GREEN.—CLOSED.



gravitation, and partly by low-level sewers of less capacity, which will be pumped into the outfalls. The pump for the northern sewage is in Partick, and for the southern in Kinning Park. The dry-weather flow of sewage included within the area drained by the works to be constructed on both banks of the river will, when the territory is developed, be about 97 million gallons per day, augmented occasionally by rainfall to 214 million gallons. The capacity of the different sewers has been so designed as to convey without surcharge a quarter of an inch of rainfall over and above the dry-weather flow.

The method of sewage treatment which the Corporation, after much anxious deliberation, have adopted, is chemical precipitation. It is not intended to make use of sludge presses, as the separate works are situated on the fairway of the Clyde, and the liquid sludge can thus be economically carried out to sea.

The works on the northern bank of the river have been completed. The Partick Pumping Station was opened on 30th May, and the Dalmuir Works were inaugurated by the Lord Provost on the 31st May, in the presence of a large assemblage of representative guests.

The working drawings and specifications for the works on the left bank of the river were prepared three years ago, but various causes induced the Corporation to delay the commencement, so that at the present time only a short extent of sewer in Govan Street has been constructed. The projected change of the site of the sewage works from Braehead to Shieldhall involves the alteration of the line of the outfall sewer, and other arrangements which require Parliamentary sanction. Application for such authority has been made, and it is hoped that the Royal assent will be obtained this session. The whole works included in the southern section of the scheme are thus held in abeyance, and it will probably be at least three years before the whole undertaking can be completed. The original borrowing powers for the scheme were £1,100,000, and these were increased in 1901 to £2,100,000.

The architectural work of the department is very extensive, including the design and construction of hospitals for infectious diseases and isolation houses for cases of suspected infection, baths and wash-houses, markets and slaughter-houses, and separate lairages and slaughtering accommodation for American cattle, public halls and libraries, lodges, waiting rooms and entrance gates for the public parks, police offices, fire stations, and the erection of improved dwellings for the labouring and artisan classes, as well as the ordinary work of superintending and maintaining a vast extent of public property.

The outlay involved in the different buildings enumerated is necessarily very great, and cannot, without occupying undue space, be set forth in detail. It may be of interest, however, to state that the hospital for infectious diseases at Ruchill has cost upwards of £250,000. A large hospital, of special design, for the treatment of smallpox is presently being drawn out for erection at Robroyston. The work at present in hand in the Baths Department represents an outlay of £20,000. The work recently carried on in connection with the markets and slaughter-houses exceeds £30,000; a new landing wharf, with lairage and slaughtering accommodation, will cost about £100,000; the extension of the fruit

market, £60,000; public halls and libraries in course of construction at present represent upwards of £30,000. The extension of the fruit market involves the erection of a new Central Police Office at a cost of not less than £40,000. The Central Fire Station cost upwards of £40,000, and the various blocks of improved dwellings at present in progress in different parts of the city, so far as these have been designed in the office of the City Engineer, will cost upwards of £25,000.

The constructional work in the different public parks, including bridges, as well as buildings, entrance gates, and railings, also devolves on the City Engineer, as does also the duty of aiding the several committees of the Corporation in protecting the amenity of the city wherever the structures of railway companies are carried over or along the leading thoroughfares of the city.

CLEANSING DEPARTMENT.

IN the seventeenth century municipal cleansing had yet to be begun in Glasgow. In the absence of any obligations to attend to such matters, the inhabitants could simply do as they pleased, and were practically a law unto themselves. The city, notwithstanding the absence of any recognised methods of cleansing, was nevertheless looked upon as a paragon of cleanliness as compared with other large towns in the kingdom. The condition of such towns must, indeed, have been unenviable when Glasgow, under such circumstances, was termed a well-cleansed city. From ancient records it is apparent that numerous, but unsuccessful, efforts were made to induce the inhabitants to introduce more cleanly methods.

In 1599 it was ordained that the middens, which were placed on the street near to the entrance to the houses, be removed under penalties or fines, or of escheating the "fulzie," which would, in that event, be removed by "ane common carter man," and the proceeds of the sale thereof devoted to charity.

In 1646-47, when the city was visited by the plague, special efforts were put forth. A second horse was purchased for "clenging" the streets.

In 1655, the inhabitants were found to be damming back with "fulzie" the water which found its way to St. Tenowes (St. Enoch's) Burn, the object being the enriching of the contents of their middens. In consequence thereof, we find "that the current of water was stoppit, so that the people in the Trongait were forcit to mak brige stones for entrie to their houses." It was "thairfor enacted and ordained that every heretor or tenant be chairgit at all occasions to red the passadge of the water thair foiranent themselvis, and that onder the payne of fyve pundis how oft and swa of as they shall contravin."

Edicts of this description appear to have been issued frequently during the seventeenth century. It is, therefore, evident that people paid little attention to them, and that the authorities did not enforce them. According to minute of 19th January, 1656, an attempt at street sweeping was made by causing the inhabitants to "clat the calsay weeklie" in front of their premises under penalty of "fourtie schillings scottis."

It was not until the passing of the Police Act of 1800 that the removal of refuse and the sweeping of the streets was looked upon as a public duty. The cleansing of the city was added to the duties of the master of police or chief constable. No separate staff was set aside for the work, however, the night watchman or policeman being entrusted with the cleansing, as well as the watching of the streets of the city. Their first attempt in the way of cleansing was to devote two hours twice a week to the sweeping of the street. Such an occupation would scarcely accord with the dignity of our blue-coated representatives of law and order of the present day.

In 1804 a new departure was made. Fourteen scavengers were appointed. But, while previously policemen acted partly as scavengers, these fourteen scavengers were now required to act partly as policemen. It is uncertain how long this dual arrangement continued, but in 1815 it is recorded that a cleansing staff existed. These numbered 16 men all told. They were paid at the rate of 11s. per week, with the exception of one—presumably the superintendent—who received the munificent salary of 15s. per week.

Up till this time the Town Council did not possess statutory powers in connection with the cleansing of the city, and it was in 1843 that the first Act empowered them to deal with the watering, sweeping, and cleansing of the streets, lanes, and passages. This was undoubtedly a step in the right direction, but it did not go far enough, for the inhabitants were still allowed to deal with the contents of their ashpits as they might think fit.

By the Act of 1862 all such refuse was vested in the Police Commissioners, so that henceforth the hoarding up of the contents of the middens was doomed. To undertake this portion of the work a contractor was employed. This functionary was not only paid for the collection and removal of the refuse, but had the privilege of disposing of it to the best advantage.

In 1866 power was obtained to cleanse private streets and courts, and impose upon the proprietors an assessment of one penny per £ of rental towards cost of doing so.

The contract system for collection of domestic refuse obtained until May, 1868, when the Police Commissioners took into their own hands the whole cleansing of the city, removal and disposal of domestic refuse, as well as the sweeping and watering of streets. It was at this point that the City Cleansing Department was instituted, and an inspector of cleansing appointed. According to the statute that official is "held responsible for the entire operations of the department, the keeping of books and accounts in connection therewith, the good conduct of all persons appointed by him, and generally for the efficiency of the department."

The rate of assessment for the maintenance of roads and bridges, and providing for a sinking fund of 5 per cent. for permanent paving and 2 per cent. for bridges, is at present 5 $\frac{1}{4}$ d. per £ on rental—one-half payable by the proprietor and one-half by the tenant. This assessment provided the sum of £102,475 15s. 7d. for the year ending 31st May, 1904. The length of the public streets is 220 $\frac{1}{2}$ miles, of which 112 miles are macadamised.

BRIDGES.

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Dumbarton Road Bridge,	"	1877, ...	60 "	—
Old Dumbarton Rd. Bridge,	"	1896, ...	50 "	—

Bridges over Canal.

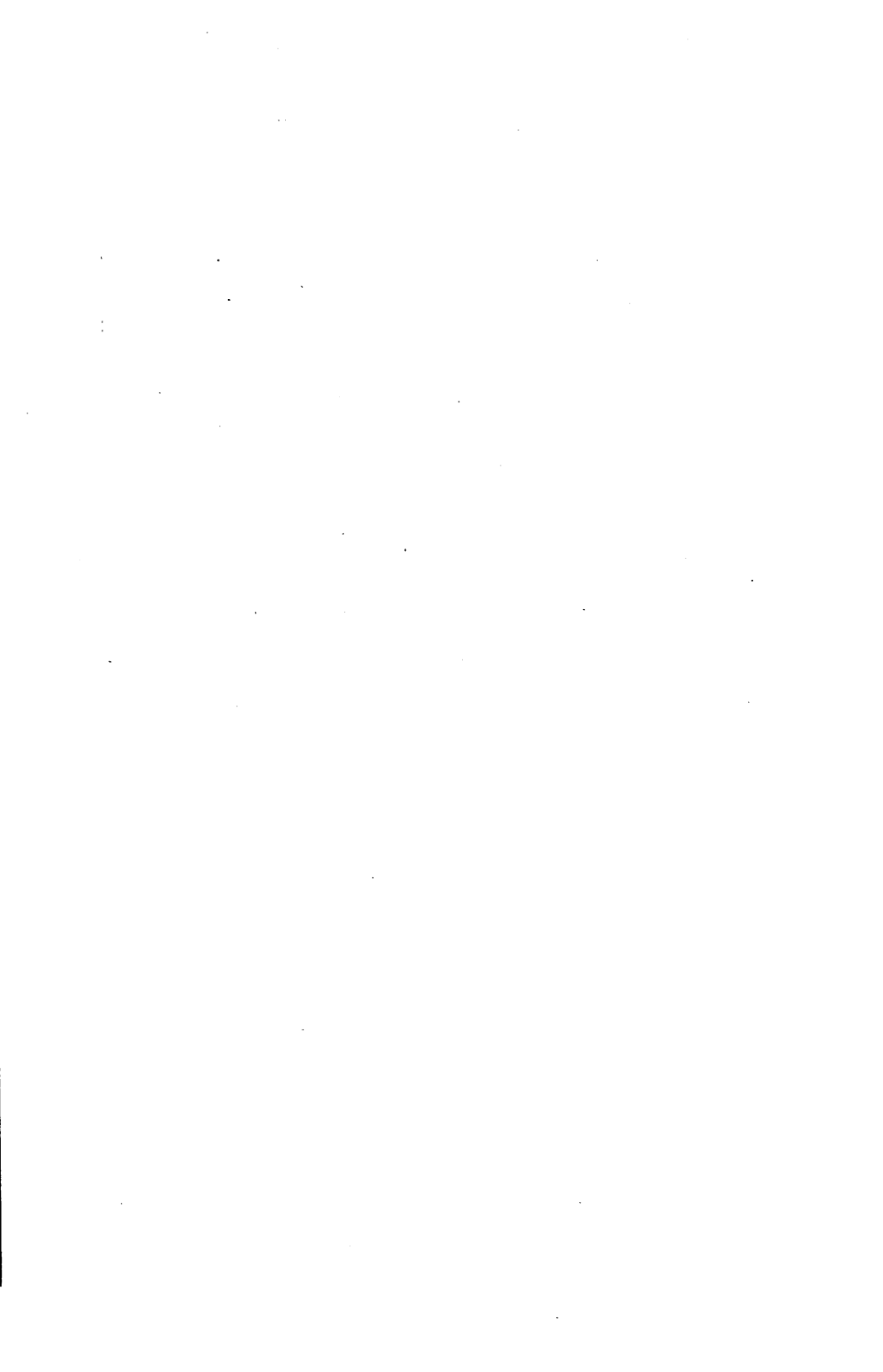
		Opened.	Width.	Cost.
Castle Street, ...	Stone,	—	60 feet,	—
Garngad Road, ...	"	—	50 "	—
Millburn Street, ...	Iron,	—	50 "	£2,431



WASTE PAPER COLLECTION.



REFUSE DESTRUCTOR WORKS

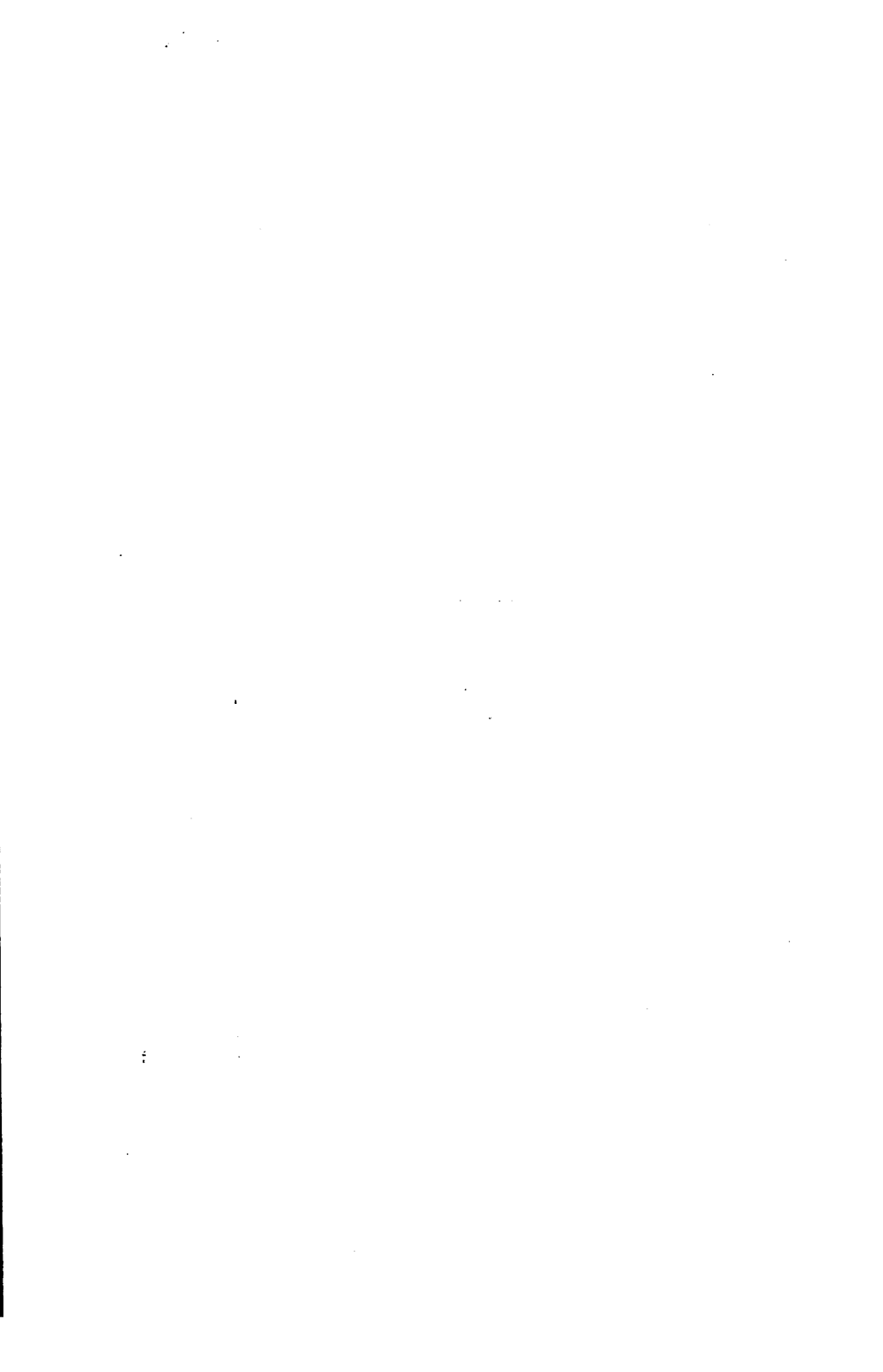




STREET BINS.



HOSE-WASHING OF STREETS.



compared with hand or mechanical sweeping, hose-washing is infinitely superior, but it must be borne in mind, however, that the process should only be applied in streets where the paving is properly grouted with bitumen, or the surface done with a smooth impervious substance.

STREET WASHING.

Macadam Roads.—The sweeping of macadamised roads is done by the day staff, the mud collected being either deposited in convenient tips on the outskirts of the city, or trucked to the farms of the department in the country, it having no manurial value.

Snowfalls.—Snowfalls tax the resources of the department to the utmost. Horses and carts are hired to assist in the removal of the snow, the cleaner portion of which is tipped into the Rivers Clyde and Kelvin at different points, but large quantities are also deposited upon vacant pieces of ground around the city, from which, when the snow has melted, any residuum is carted away.

Watering.—In connection with the watering of the streets in the busier portions of the city, the watering carts used are of the ordinary barrel type. For the quieter roads in the outskirts, however, revolving machines are used, which so spread the water as to cover on one run a road 40 feet wide, whilst two, and in some cases three, runs of the ordinary water barrel are required for a road of the same breadth. Watering is also resorted to during the night in dry weather, to prevent dust arising from the operations of the sweeping machines.

Private Streets and Courts.—Prior to 1866 the owners of property were responsible for the cleansing of back courts and closes. Since that year, however, this work has been attended to by a staff of the Cleansing Department, the cost being met by a special rate of one penny per pound payable by the proprietors. Under this arrangement the courts and closes of the city, with very few exceptions, are attended to daily, and in many cases twice or thrice a day, as necessity requires.

The dirtier courts are regularly hose-washed.

When hose washing was first introduced taps were fitted into the courts, at the expense of the Corporation, to the number of 1,952, the hose pipes used in connection with these being of 1 inch diameter. Some years ago this system was improved upon by the introduction of a reel and carriage similar to that used for street washing, drawing its water supply from the hydrants on the street, and the new method has to a very large extent displaced the old. Even courts in which the small hose is used regularly are washed at stated intervals by the reels.

The larger volume of water and much increased pressure from the latter thoroughly cleanse the filthiest surfaces; of course, this is only possible where the paving of the court is of a hard impervious substance.

COLLECTION AND REMOVAL OF REFUSE.

Domestic Refuse.—As noted in the introductory pages, ashpits for the reception of the domestic refuse were, in the days that were earlier, placed upon the public streets, each opposite its respective house.

Later they were transferred to the back courts, and there, as many as still exist, remain.

The abolition of pan closets and of conveniences connected with the ashpits, together with the general introduction of water-closets, has quite changed the nature of the refuse, and it is now comparatively free from anything noxious.

Until about 20 years ago ashpits were only emptied when they could contain no more, but at that time what is known as the block system was adopted, each cleansing district being sub-divided into six sections, one of which was attended to each night, so that the ashpits in the whole district were regularly emptied once a week.

Exceptionally the Central District was given a twice-a-week service.

In the year 1899 it was decided to abolish ashpits, and to substitute in their stead portable bins.

These bins are placed in covered sheds in the back yards, and the contents are carried out and deposited in large covered vehicles, so that neither court, close, nor street is soiled in the process, and the material is effectually prevented from getting blown about.

Refuse from Business Premises.—The refuse from offices, shops, warehouses, and other business premises (not manufactories) in the centre or business portion of the city is removed daily by the morning dust-cart service. For the convenience of occupiers of such premises the department supplies covered galvanised-iron bins of a uniform pattern at cost price.

Excrementitious Matter and Fish Refuse.—These materials are collected in galvanised-iron pails of a regulation pattern, fitted with air-tight spring lids, the pails on removal being replaced by clean ones. Fish refuse, until within recent years, was simply collected in barrels or anything handy, thrown out, and removed along with the ordinary refuse, the mixture being anything but a pleasant or profitable product. A specially-constructed covered van is used for the conveyance of these pails, so that the process is neither offensive to the senses of sight or smell.

Waste Paper.—The separate collection of waste paper is now a recognised branch of the service. It was introduced with the view of reducing, as far as possible, the nuisance caused by the scattering of waste paper on the public streets. Bags for holding the paper are issued to offices, business premises, and better-class dwelling-houses, and are called for as often as necessary by youths wearing a distinctive uniform. Covered vehicles are used for the collection of the bags. By this system the paper is not only kept off the streets, but, being collected separately from the refuse, it forms a marketable commodity, and a considerable revenue is derived from its sale.

Stable Manure and Trade Refuse.—In addition to the ordinary city refuse, the department undertakes, by arrangement, the collection and disposal of manure from the public abattoirs and from various stables in the city, as well as that of various kinds of trade refuse.

Treatment of Refuse.—Having described the methods of collecting the various classes of city refuse falling to be dealt with by the department, the next process to be explained is its treatment.

For a number of years after 1868, when the collection and disposal of city refuse was taken over by the Corporation from the contractor, there were no other means of dealing with the material than by tipping it in open depots, or into railway wagons at loading banks. In those depots there were stored at times many thousands of tons of refuse. In 1874 the quantity actually on hand in the heat of mid-summer was 28,860 tons. Little wonder that there were frequent and clamorous complaints as to the nuisance arising from these accumulations. With the advance of sanitary science, however, other and better means had to be devised, and the present system of mechanical treatment was gradually organised.

The following are the years in which the various works were erected, showing the development of the system:—

- 1881, St. Rollox Despatch Works.
- 1884, Crawford Street Despatch Works.
- 1890, Kelvinhaugh Despatch Works.
- 1894, Dalmarnock, furnaces only.
- 1897, Haghill Despatch Works.
- 1902, Ruchill Destructor Works.
- 1904, Crawford Street Extension, to be worked upon the continuous system.

At Dalmarnock, Ruchill, and Crawford Street Extension the method of disposal is by cremation only. The furnaces are worked upon the continuous system, and, having boilers attached, steam is generated for the purposes of electric lighting of the works, driving clinker crushing and screening plant, and providing forced blast.

At the refuse despatch works the system is entirely different, the preparation of the fertilizer known as "Prepared City Manure" forming an important part of the process.

The mode of working at the despatch works is as follows:—

Soft sweepings from paved streets are tipped into a series of specially-designed tanks, which are fitted with sloping bottoms and drainers for carrying off the water. After a day or two the material gets into a fit state to be handled, and is barrowed to a wagon. Domestic refuse is shot through openings in the floor into revolving riddles placed horizontally. The finer portions of the refuse pass through the meshes of the riddle into a mixing machine underneath, which also receives a regulated quantity of excrementitious matter from a tank above. The closet pails, already referred to, are emptied into this tank, thereafter washed in hot water, and disinfected, ready for issuing again. Dry sweepings from paved streets are also passed through the riddle and into the mixer; the whole, after being thoroughly mixed by means of revolving blades, falls into a railway wagon on the siding below. The rougher portions, which cannot pass through the riddle, are forced from its bell-shaped mouth by the revolving process on to an endless carrier.

When passing over this carrier articles of any value, such as iron, meat tins and fruit tins, glass, bones, &c., are picked off, while the remainder, chiefly light, useless material, falls from the carrier on to a range of furnaces on a lower level.

The important features in connection with these destructor furnaces are that they are of simple construction, and that the vitiated air from the works is driven by means of a powerful fan at the rate of 40,000 cubic feet per minute into pipes which lead into the chambers underneath, thus forming not only a strong forced draught, but at the same time burning the bad air. The smoke, of which there is very little, is light blue in colour, and is carried off by means of a tall chimney.

It will thus be seen that the process is one of separation of the saleable from the unsaleable. The better portions, which fall direct into the wagon, form a good fertiliser, and find a ready sale among agriculturists, only the rougher material, which is passed to the furnaces, being cremated.

Utilisation of Material saved from Refuse.—As already stated, tins, bottles, iron, glass, and bones are picked off, laid aside, and sold, but the most important source of revenue in this connection is from the sale of clinker from the destructor furnaces. Previous to 1896, this residuum was trucked to tips in the country, at a cost of 1s. per ton. In that year, however, an endeavour was made to find a market for it as a material for making concrete. To begin with, it was broken by hand labour, but, as the demand increased, it was found advantageous to use mechanical breakers. Screening machinery has more recently been erected, which produces the clinker in five different sizes, so as to meet the requirements of contractors. Instead, therefore, of paying for the disposal of this waste product, a considerable revenue is now derived, and this may be considered altogether saved money, as the cost of breaking is considerably less than the cost of the former method of disposal. The following figures show the rapidly-increasing success of this new departure:—

Year.	Clinker Sold.	Realising
1896-1897, ...	2,133 tons, ...	£242 11 2
1897-1898, ...	5,682 „ ...	613 1 10
1898-1899, ...	7,266 „ ...	804 6 0
1899-1900, ...	9,184 „ ...	1,089 11 2
1900-1901, ...	9,753 „ ...	1,095 1 10
1901-1902, ...	9,332 „ ...	1,063 19 4
1902-1903, ...	11,938 „ ...	1,422 0 9
1903-1904, ...	15,018 „ ...	1,649 10 3

In August, 1903, a plot of ground was acquired at Newlandsfield, on the Kilmarnock Road, for the purpose of erecting destructor works to accommodate the south suburban districts, but nothing has yet been done in the way of building.

The total amount realised from the sale of waste materials last year was £3,552 8s. 5d.

By the system above described, instead of the immense accumulations of refuse which in former years were to be found within the city boundary, every cartload of refuse which is collected during the night is either burned or despatched by rail to the country by ten o'clock the following morning.

Disposal of Refuse.—The collection and treatment of the refuse of the city forms no light task, but the disposal of such a huge quantity of material, which averages 1,251 tons per working day, is a question which taxes to the utmost the staff of the department. By the process of cremation, the quantity of domestic and shop refuse is considerably reduced, the reduction last year being 25 per cent., but there still fell to be disposed of by railway 36,387 wagons. Of this quantity 49·29 per cent. was sold to farmers as manure, and the remaining 50·71 per cent., being the unsaleable portion, sent to the tips at the farms of the department at Ryding, Fulwood Moss, Maryburgh, and Robroyston.

For the transit of city manure and refuse to the country, 700 railway wagons, the property of the Corporation, are employed. Special rates are fixed by Act of Parliament for the conveyance of the city manure, the department paying carriage to the railway companies, and charging the purchaser a price delivered.

ESTATES AND FARMS.

Fulwood Moss.—In consequence of the difficulty of disposing of such large quantities of material, the Cleansing Committee found it necessary to acquire land on the different railway systems. The first venture in this direction was made in 1879 by the leasing, on a 31 years' improvement lease, of 98 acres of bog land at Fulwood Moss, near Houston, Caledonian Railway, 10 miles from the city. In 1889 other 25 acres adjoining were added, and in 1896 another field of 19 acres was taken in, thus making 142 acres in all. The ground was originally a bog, and yielded no return whatever to the proprietor. The first step taken was to have the land thoroughly drained, and a railway siding run through the property. The total capital outlay in connection with this project is being cleared off in equal payments, so as to be liquidated at the expiry of the lease. For some years potatoes were the principal crop, the varieties grown on the moss finding a ready sale as seed. In recent years the chief products have been hay and oats, all of which are used in the stables of the department in town. The moss is now a first-class agricultural subject, the only regret being that it reverts to the proprietor on the expiry of the lease. Apart from providing an outlet for immense quantities of refuse annually, the cropping account of the farm has always shown a profit.

Ryding.—The Cleansing Committee, with this instance before them of the folly of taking land on lease, decided to purchase outright in future. When, therefore, it was found necessary to obtain land as an outlet for surplus refuse on the North British Railway system, they purchased the estate of Ryding, near Airdrie. This property, which was

acquired in 1891, is situated about 11 miles from the city, and originally comprised five farms, containing in all 565 acres, and cost £22 5s. 4d. per acre. Two adjoining farms have since been added, at a cost of £24 and £19 16s. 2d. per acre respectively. The whole estate now contains 821 acres. The soil of this property is, as a rule, poor and clayey, and capable of much improvement. The undulating nature of the surface lends itself admirably to the laying down of the surplus and unsaleable refuse of the city. The ground has since the date of purchase been thoroughly drained, railway sidings have been formed, and suitable buildings have been erected. The crops grown on this estate are, like Fulwood Moss, chiefly hay, oats, and turnips, which are used in the stables of the department in town. On the estate there are two whinstone quarries, which last year yielded in rent and royalty £471 11s. 6d.

Maryburgh is a small farm, 31 acres in extent, situated on the Caledonian Railway between Glenboig and Cumbernauld. It was purchased in 1895 for £1,067, the object being to provide an outlet for surplus refuse loaded on the Caledonian north line.

Hallbrae Farm, which adjoins Maryburgh, and extends to 45 acres, could not be purchased, but was leased in 1895 for nineteen years. The object of the leasing of this farm was to give more complete railway connection with Maryburgh and provide siding accommodation for the delivery of city manure to farmers in the neighbourhood.

Robroyston Estate was purchased in 1902 for the sum of £40,000, or equal to £60 19s. 4d. per acre. This is a much higher figure than that paid for Ryding Estate, but the advance in price is caused by the proximity of the estate to the city, the nearest point being only 40 feet from the city boundary. It comprises five farms, the total area being 656 acres.

Of these farms, one is already in the occupation of the department, the leases of other three terminate shortly, while the lease of the fifth has still fourteen years to run.

There are also on the estate a freestone quarry and a brick work, both of which are being worked under lease.

On this a siding has been laid down for the purpose of affording an outlet for unsaleable refuse and sewage sludge received from the Sewage Purification Works.

A railway siding runs through a portion of the estate, and there is a considerable area of bog land suitable for reclamation purposes.

The Health Committee has taken over a large stretch of the ground—154 acres or thereby—on the highest part for the purpose of erecting a smallpox hospital.

The estate has a historical interest, owing to the fact that the betrayal of Sir William Wallace took place near the old mansion-house; a monument erected by public subscription now marking the spot.

Altogether the Cleansing Department now owns and leases 1,701 acres, and the combined profits on cropping accounts last year amounted to £765 0s. 8d.



CORPORATION QUARRIES.



CORPORATION FARM.

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WORKSHOPS, GRANARY, AND STORES.

Workshops.—The workshops of the department are situated at Charles Street, St. Rollox, contiguous to the destructor station. Here the vehicles used by the department are made and repaired, and the railway wagons kept in running order. A railway siding runs right into the wagon-repairing shop, and all wagons requiring repairs are sent thither by arrangement with the three railway companies. Labour-saving machinery of the most modern description is provided, and driven by power derived from the adjoining destructor works. The tradesmen include joiners, cartwrights, wagon-builders, blacksmiths, engineers, turners, painters, and saddlers. Horse-shoeing is the only portion of the work which is not done by the employees of the department. Owing to the rapid extension of the city, and the consequent necessity of erecting stables in the outlying districts, it is more convenient to have the horses shod by local horse-shoers near the various stables than to send them from all points of the city to a central shoeing forge.

Granary and Stores.—The granary and general stores of the department are centrally situated in Grange Street, quite near Glasgow Cross.

The granary is a building of four storeys, fitted with the most modern machinery, and arranged on the most up-to-date principles. The grain is elevated by means of a hoist to the upper floor, where the various kinds are fed into large hoppers. They pass automatically from flat to flat through the processes of measuring, cleaning, sifting, bruising, mixing, and finally bagging, ready for despatch to the different stables. By means of this mechanical process all dust is removed from the grain, while magnets extract all nails or other pieces of iron or steel.

All the hay required for the stud is grown on the department farms. It is baled at the farms, railed to town, and cut in the granary, all dust being removed. The straw and grain grown on the farms do not altogether meet the requirements of the department, and it is therefore necessary to purchase from dealers in town. The cost of feeding and bedding the horses of the department during year ended 31st May, 1903, was 10s. 10·88d. per horse per week.

From the general stores all the material and implements required in the different districts are issued. They are of a very varied description, and are purchased under thirty-four different contracts, which are fixed annually.

HERITABLE PROPERTY.

The heritable and movable property of the department in 1868, when it was organised on the present footing, amounted to £19,162. In 1884 the property was valued at £74,469. Now the figure is £354,566. The total sum dealt with in 1868 was £55,924; in 1884, £113,984; and for the year ended 31st May, 1904, was £189,872.

COST OF CLEANSING.

In the cleansing of the city the endeavour has always been to maintain the maximum of efficiency at the minimum cost. Of course, in a city like Glasgow, where the industries are so various, the traffic so great,

and the smoke so abundant, the work of cleansing is much more difficult than in non-industrial centres.

For the year ending 1904 the expenditure on general cleansing was £131,114; the revenue derived from sale of manure and other sources, £35,089, leaving a net cost to be provided from the general rates of £96,024.

The cleansing of private streets and courts, which is done for the proprietors, and for which a special assessment of 1d. per £ is charged, cost £16,968 1s. 3d. This is work which is not done by the corporations of other cities, and, therefore, in making any comparison, it must be left out of account. The net cost of cleansing the city, apart from this item, was, for the year ending 31st May, 1904, equal to a rate of 4·26d. per £ on the rental of the city. This rate compares very favourably with that of other cities, but, when the circumstances just mentioned are taken into consideration, as well as the climatic conditions which prevail during a large part of the year, the comparison is still more favourable to Glasgow.

While circumstances continue as they are, it cannot be expected that the cost will decrease, but, when in process of time Glasgow has been turned into the garden city which is presently only dreamed of, we may hope that even the present very moderate rate will show a substantial decrease.

GAS DEPARTMENT.

Gas was first supplied to Glasgow in 1818 by the Glasgow Gas Light Company. No record of the quantity manufactured was kept until 1827, when meters were first introduced. In that year the total quantity made was about 80,000,000 cubic feet. In 1843 this had increased to 217,000,000, and in that year a rival company, called "The City and Suburban Gas Company," was inaugurated. Both companies continued to supply gas in competition within the same area until the year 1869, when the Corporation acquired by Act of Parliament the works of both companies. The following table shows the development in gas manufacture:—

Year.	Gas made in cubic feet.	Price per 1,000 cubic feet.	Total Revenue, including Gas, Coke, Residuals, &c.
1860	769,241,000	5s. 0d.	£153,585
1870	1,295,863,000	4s. 7d.	235,701
1880	1,859,582,000	3s. 10d.	341,274
1890	3,058,277,000	2s. 6d.	417,589
1900	5,969,111,000	2s. 2d.	770,002
1904	6,641,891,000	2s. 1d.	885,413 (for 1903)

The Corporation now supply an area of 16 miles in extreme length and 12 miles in extreme breadth. The number of consumers is 219,548.

No meter rent is charged. There are four works within the area of supply. The Dalmarnock Works (formerly the City and Suburban Gas Company's Works) are situated at the east end of the city, and are capable of manufacturing about 7,000,000 cubic feet per day. The Tradeston Works (formerly the Glasgow Gas Light Company's Works) are on the south side of the river, and were built in 1838. In 1869 their manufacturing capacity was one and a-half million cubic feet per day, and in 1888 it had been increased to four and a-half million cubic feet per day. The extension of the district supplied by these works was, however, so rapid that in that year it was determined to reconstruct the works, so as to enable the producing power to be largely increased. In order to carry out the reconstruction, it was necessary to acquire additional ground, to shut up and utilise a street which separated the two portions of the works, and connect the latter by bridges across the Caledonian Railway Company's main line. By this reconstruction the manufacturing capacity of the Tradeston Works has been increased to 10,000,000 cubic feet per day.

The Dawsholm Works were erected in 1871. The portion first erected had a manufacturing capacity of 3,000,000 cubic feet per day. In 1883 this was increased to 8,000,000. In 1891 the adjoining works of the Partick, Hillhead, and Maryhill Gas Company were acquired by the Corporation. These works are separated from the Dawsholm Works by the Forth and Clyde Canal, and to enable the works to be combined a tunnel has been constructed under the canal, through which the gas mains are laid, and railway and foot traffic carried on. In 1892 an additional retort house, containing 512 retorts, was erected. Four years later another retort house of similar dimensions was constructed, and the Dawsholm Works have now a manufacturing capacity of about 19,000,000 cubic feet per day. Both Tradeston and Dawsholm Works are fully equipped with machinery for manipulating the coal and coke.

There being no room for further extensions at the existing works, and as the demand for gas continued to increase, the necessity for the erection of new gas-works became evident, and the selection of a suitable site had to be carefully considered. In 1898 a site was selected at Provan, on the eastern boundary of the municipal area, as being, on the whole, the most suitable, and in 1899 an Act of Parliament was obtained to empower the Corporation to purchase the lands included in this site, and to erect new gas-works thereon. The area of the site is 131 acres. It is conveniently situated for both railway and canal communication. The levels are somewhat irregular, but advantage is being taken of the difference in levels to facilitate the transference of material. The coals, lime, &c., will be brought in at a high level, and the coke and other materials sent away at a low level. The works, when completed, will be in four sections, each section forming an independent work, which will be capable of manufacturing 12,000,000 cubic feet per day, or a total of 48,000,000 cubic feet. The works have been designed, and mechanical appliances will be introduced wherever possible, to reduce the cost of manufacturing in every department. Railway siding accommodation will be provided sufficient to deal with 4,000 tons of material daily. The total length of railway lines inside the works will be about eight miles, and, in addition,

there will be about five miles of 2-foot 6-inch gauge lines for conveying coke, waste lime, &c.

The following statistics for the last financial year, viz., 1902-03, will give some idea of the business carried on by the Gas Department:—Coals used, 707,392 tons; coke sold, 281,471 tons; revenue from sale of tar and ammoniacal liquor, £159,516. Maximum number of men employed in mid-winter in gas-works, 2,688; in workshops, 730—total, 3,418.

The companies held two kinds of stock, one entitled to a maximum dividend of 10 per cent., and the other $7\frac{1}{2}$ per cent. Under the Corporation's Act, holders of the former received perpetual annuities of 9 per cent., and of the latter $6\frac{3}{4}$ per cent., these annuities being secured by a lien on the gas-works, on the revenue derived from the manufacture of gas, and by a guarantee rate of 6d. per £ leviable from the inhabitants of Glasgow in respect of rental.

The amount at the credit of the sinking fund at 31st May last is £463,895 13s. 10d.

SUMMARY OF CAPITAL EXPENDITURE ON GLASGOW CORPORATION GAS-WORKS,
AS AT 31ST MAY, 1903.

I. <i>Dalmarnock Gas-works</i> —			
Amount expended,	£257,708	12	0
Deduct property realised,	15,599	10	6
			£242,109 1 6
II. <i>Tradeston Gas-works</i> —			
Amount expended,	£337,963	8	4
Deduct property realised,	7,168	7	2
			330,795 1 2
III. <i>Dawsholm Gas-works</i> (including Temple and Old Kilpatrick Gas-works, taken over by the Corporation in 1891)—			
Amount expended,	£802,321	16	1
Deduct property realised,	19,073	8	1
			783,248 8 0
IV. <i>Provan Gas-works</i> —			
Amount expended,	£492,924	0	2
			492,924 0 2
V. <i>Workshops and other Properties</i> —			
Amount expended,	£130,333	6	4
Deduct property realised,	18,174	4	6
			112,159 1 10
VI. <i>Pipes, Meters, Stoves, &c.</i> —			
Amount expended,	£1,251,618	0	7
Deduct property realised,	19,336	10	8
			£1,232,281 9 11
			<u>£3,193,517 2 7</u>

GLASGOW CORPORATION WATER-WORKS.

IN 1855, the Lord Provost, Magistrates, and Council of Glasgow obtained power, as Water Commissioners, to acquire the works of the Glasgow Water Company and the Gorbals Gravitation Water Company, and to construct new works for bringing a plentiful supply of pure water to the city and surrounding districts from Loch Katrine, in the Perthshire Highlands, a distance, measuring to Glasgow Bridge, of 34½ miles.

I.—LOCH KATRINE WORKS.

There are now two lines of aqueduct for conveying the water from Loch Katrine to Glasgow. One was constructed under the Act of 1855, and was designed and carried out by the late Mr. J. F. La Trobe Bateman, M.Inst.C.E.; the other was constructed under an Act of 1885, and was designed and carried out by Mr. James M. Gale, M.Inst.C.E., late Engineer to the Corporation Water Department.

By the Act of 1855, power was taken (1) to raise Loch Katrine 4 feet above its previous summer level, and to draw it down 3 feet below the same level, making 7 feet of depth available for water supply purposes; (2) to take 50,000,000 gallons of water per day for the supply of the city and suburbs; (3) to construct a line of aqueduct and a service reservoir; and (4) to utilise the waters of Lochs Vennachar and Drunkie as compensation water to the River Teith.

By the Act of 1885, power was taken (1) to raise Loch Katrine other 5 feet, making 12 feet of depth in all available for the supply to the city; (2) to take a further 60,000,000 gallons of water per day for the supply of the city and suburbs; (3) to construct a duplicate line of aqueduct and service reservoir, with lines of pipes to the city; and (4) to raise Loch Arklet 25 feet above its present level, and lead the water from this loch into Loch Katrine by a tunnel.

The Aqueducts.—The first aqueduct from Loch Katrine to the service reservoir at Milngavie is 25½ miles in length. It is 8 feet wide by 8 feet high, with arched roof, and is capable of discharging 40,000,000 gallons per day. The second aqueduct, which runs almost parallel with the first all the way from the loch to the service reservoirs, is 23½ miles in length. It is 12 feet wide by 9 feet high, with arched roof, where not lined with concrete, and 10 feet wide by 9 feet high, with arched roof, where lined with concrete, and is capable of discharging 70,000,000 gallons per day. The two aqueducts, taken together, are capable of discharging 110,000,000 gallons per day into the two service reservoirs, which are distant about 7 miles from the city.

The Service Reservoirs.—The Mugdock Reservoir has a water surface of 62 acres and a capacity of 500 million gallons. The Craigmaddie Reservoir has a water surface of 88 acres and a capacity of 700 million gallons. Combined, these two reservoirs contain 24 days' supply at the rate of 50,000,000 gallons per day. Six lines of 36-inch main pipes convey the water from the reservoirs to Glasgow, viz., four from Mugdock Reservoir, and two from Craigmaddie Reservoir.

The water from Loch Katrine undergoes no filtration, being merely strained through fine wire gauze netting to prevent sticks, leaves, &c., from passing into the pipes. In order that the water might be kept free from pollution, the feuing rights over the whole drainage area of Loch Katrine and Loch Arklet, extending to 26,295 acres, were, in 1892, purchased by the Corporation at a cost of £17,000, and the owners of the lands within that area are prohibited from erecting any houses or buildings on any part of those lands.

II.—GORBALS WORKS.

The Gorbals Gravitation Water-works were constructed in 1847-48, by the Gorbals Gravitation Water Company, to supply the Gorbals district, or that part of the city which lay on the south side of the river, which at that time had a population of about 50,000 persons. These works were acquired by the Corporation, as Water Commissioners, in 1855.

The supply of water is drawn from the Brook Burn, a tributary of the White Cart, about six miles south from Glasgow, and is impounded in four artificial reservoirs—the drainage area to the lowest reservoir being 2,560 acres.

The four reservoirs are—

1. *Balgray Reservoir*.—Top water level, 352 feet above sea level. When full it covers $153\frac{1}{2}$ acres, and the available depth of water is 40 feet.
2. *Ryat Linn Reservoir*.—Top water level, 313 feet above sea level. When full it covers 21 acres, and the available depth of water is 27 feet 9 inches.
3. *Waulkmill Glen Reservoir*.—Top water level, 296 feet above sea level. When full it covers $47\frac{1}{4}$ acres, and the available depth of water is 49 feet 3 inches.
4. *Littleton Reservoir*.—Top water level, 297 feet above sea level. When full it covers 4 acres, and the available depth of water is 14 feet.

These four reservoirs have altogether a water surface of $226\frac{1}{4}$ acres, and contain when full 1,058 millions of gallons of water, which is equal to 211 days' supply, at 5,000,000 gallons per day. The compensation water to the Brook Burn, when it leaves the works, is 1,450,000 gallons per day, equal to 9 inches of rainfall over the drainage area.

FILTER BEDS.

There are two sets of filter beds, known as the upper and lower filters. The lower filters have an area of 3,842 square yards, and deliver water to a clear water tank situated 239 feet 6 inches above sea level, containing 3,250,000 gallons.

The upper filters have an area of 4,000 square yards, and deliver water to a clear water tank situated 294 feet 6 inches above sea level, containing 1,875,000 gallons. Additional beds are presently under construction which will increase the area of the upper filters to 6,000 square yards.



LOCH KATRINE AND ELLEN'S ISLE.

The filters and clear water tanks are constructed of concrete and masonry. The filtering materials are arranged as follows:—

			Ft.	In.
Brick drains laid on concrete bottom, ...	...	...	—	—
Broken sandstone, 2 to 2½ inch, ..	...	...	1	6½
Gravel, 1½ to ¾ inch, ...	...	...	0	4½
Tiles to separate sand from gravel, ...	...	...	0	1½
Sand, riddled and washed, ...	...	...	2	6
Total depth of filtering materials, ...			4	6

MAINS.

The main from these works to the city is 24 inches in diameter, and arrangements have recently been made for duplicating this main throughout the greater part of its length.

III.—HYDRAULIC POWER SUPPLY.

The Hydraulic Power Works are situated at the top of High Street. They were erected a few years ago for the purpose of supplying high-pressure water for power purposes. This branch of the work supplies a felt want, and has already been taken advantage of to a considerable extent in working hoists, hydraulic presses, and other machinery. The plant consists of four large Lancashire boilers with economisers, four sets of pumping engines of 200 horse-power each, and two accumulators. Each of the pumping engines will pump 250 gallons of water per minute against an accumulator pressure of 1,120 lbs., and this with a steam pressure of 150 lbs. The engines work independently, and deliver the water into either of the four 7-inch main pipes. About 25 miles of special pipes for this high-pressure water have been laid in the streets of the city, and the cost of the works has been upwards of £123,000. The quantity of water supplied during the year 1902-1903 was 168,347 gallons per day, and the revenue received was £10,947.

IV.—RIVER SUPPLY WORKS.

The River Supply Works were erected in 1876 and 1877 on the lands of Westthorn, situated about two and a-half miles above Glasgow Bridge, to supply millowners and others who had a right to draw water from the river by means of their own pumping appliances, with water pumped from the Clyde and distributed by the Corporation. These works were made necessary by the removal of an old weir, which alteration so lowered the water level in the upper part of the river that many private pumping appliances were rendered unsuitable. The machinery consists of two compound tandem horizontal engines of about 100 horse-power each, with double-acting pumps, and four Lancashire boilers with economiser and feed pumps. Each engine is capable of pumping 200,000 gallons of water per hour into reservoirs, which are about 60 feet above the level of the river. The cost of the works has been £103,010. The average quantity of water pumped during the year 1902-1903 was 2,717,027 gallons per day, and the revenue drawn for that year was £3,237.

V.—FINANCE.

In 1857, the capital account of the Water Department (including £525,380, being the share capital of the old companies) was £752,693, and in 1903 it amounted to £3,976,970.

Revenue, exclusive of Hydraulic Power Works and River Supply Works—

	Per Annum.
In 1859-60, when the Loch Katrine water was introduced, the revenue was	£71,449
In 1869-70,	111,486
In 1879-80,	138,993
In 1889-90,	171,256
In 1899-1900,	202,042
In 1902-1903,	225,843

Within the municipality of Glasgow, on the north side of the River Clyde, where the power of rating is unlimited, the domestic rate—

	Per £ on Rental.
In 1856-57 was	1s. 2d.
In 1862-63 and 1863-64,	1s. 4d.
In 1864-65,	1s. 2d.
In 1865-66 to 1869-70,	1s. 0d.
In 1870-71,	9d.
In 1871-72 to 1886-87,	8d.
In 1887-88 to 1889-90,	7d.
In 1890-91 to 1898-99,	6d.
In 1899-1900 to 1903-4,	5d.

Within the municipality on the south side of the River Clyde, where the domestic rate is restricted to 1s. per £, the rates levied have been—

	Per £ on Rental.
In 1856-57 to 1869-70,	1s. 0d.
In 1870-71,	9d.

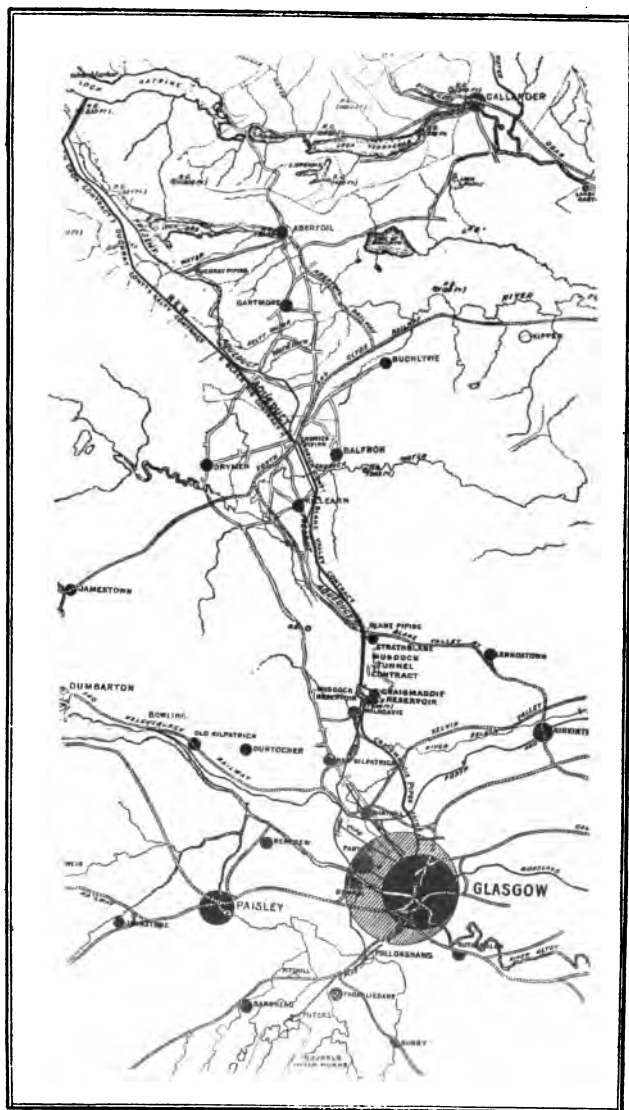
and since 1871 the same rate as on the north side of the river. In addition, a public water rate of 1d. per £, payable by the owner, is levied on all property within the municipality.

Beyond the municipality, the domestic rates have been reduced from 1s. 2d. and 1s. to 10d. per £ on rental.

Meter rates have been reduced from a sliding scale, beginning at 1s. per 1,000 gallons in 1861-62, to a present uniform charge of 4d. per 1,000 gallons—minimum charge, £2 per annum; charges for shops, warehouses, &c., private taps, from 5s. to 10s. according to rental; tap common to more than one tenant, from 3s. to 5s., according to rental; closets, 3s. to 5s.

All charitable institutions are supplied free of charge. The Water Department also supply water free of charge to fourteen public baths and wash-houses in the city belonging to the Corporation. The Water Department do not charge the Corporation for water used for cleansing purposes, watering streets, flushing sewers, &c.; and, in exchange, the Corporation, as the Police Department, do not levy any assessment on the value of water pipes, &c., for police and statute labour purposes.

The Water Department has, since 1870, when the sinking fund came



MAP SHEWING LINES OF AQUEDUCTS.

into operation, set aside from revenue in connection with their works £1,196,570 as a sinking fund, and that fund has been, and is being, used in paying off borrowed money, and in the purchase of the annuities granted to the shareholders of the old companies.

VI.—POPULATION SUPPLIED, &c.

The population at present being supplied is about 1,075,000, and the quantity of water sent in during the year 1902-1903 averaged 60,960,235 gallons per day, viz. :—

From Loch Katrine Works,	56,324,881	galls.
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„ Gorbals Works,	4,635,354	„
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The consumpt is equal to 56½ gallons per head per day, viz. :—

For domestic consumpt,	34	galls.
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„ trade and public purposes,	22½	„
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The limits of supply under the Glasgow Corporation Water-works Act of 1855 at present cover an area measuring about twelve miles from east to west, and sixteen miles from north to south, and include the royal burghs of Rutherglen and Renfrew, the burghs of Govan, Partick, Pollokshaws, Barrhead, Milngavie, Kinning Park, and the towns or villages of Nithill, Thornliebank, Cathcart, Cardonald, Mount Vernon, Carmyle, Tollcross, Shettleston, Millerston, Bishopbriggs, Auchinairn, Strathblane, Bearsden, Yoker, and Scotstoun.

VII.—SUMMARY OF CAPITAL EXPENDITURE ON GLASGOW CORPORATION WATER-WORKS AS AT 31ST MAY, 1903.

I. Value of the works taken over from the Glasgow Water Company and the Gorbals Gravitation Water Company,	£597,374	6	6
II. Cost of first aqueduct from Loch Katrine, Mugdock Reservoir, and distributing main pipes, including land, &c., and Parliamentary expenses,	1,500,538	14	9
III. Cost of new filters at Gorbals Works, pumping stations at Springburn and Hogganfield, buildings used as offices, stores, and cottages for inspectors, and new roads,	73,219	8	11
IV. Cost of second aqueduct from Loch Katrine, Craigmaddie Reservoir, including land, and distributing main pipes,	1,579,226	9	11
V. Cost of Hydraulic Power Works in High Street, including land,	123,601	5	1
VI. Cost of River Supply Works at Westthorn, including land,	103,010	2	5
	<u>£3,976,970</u>	<u>7</u>	<u>7</u>

ELECTRICITY DEPARTMENT.

COMPARATIVELY little had been done in the way of general electricity supply in Glasgow before 1890. By the Corporation Gas Bill of 1882 it was proposed to take statutory powers to supply electricity, but the clauses were struck out before the Bill came before any Parliamentary Committee for consideration. The nearest practical attempt towards a general supply was made by the British Electric Company, Limited, who laid down Gramme dynamos to light the Glasgow and South-Western Railway Company's St. Enoch Station in 1879, and by the firm of R. E. Crompton & Co., Chelmsford, who laid down plant in 1879-80 to supply the North British Railway Company's Queen Street Station with electricity at a stated charge; but these attempts did not develop into a general supply, the railway companies ultimately purchasing the plant and lighting the station themselves. The next attempt towards a general supply was made by Messrs. Muir & Mavor, who in 1879-80 laid down temporary plant on the area now covered by the Municipal Buildings, afterwards removing it to the basement of the General Post Office. Later, in 1884, they placed in Miller Street permanent plant to supply the General Post Office in George Square, the cables from Miller Street being carried over the tops of the intervening buildings. In regard to the last-mentioned supply, it is interesting to note that the Glasgow Post Office was the first post office in the kingdom to be lighted by electricity, and it has been stated that it was owing to the attention of the Post Office Authorities being called to the improved health of the Glasgow officials by the use of this system of lighting that electricity was introduced into London and other post offices.

On 6th June, 1888, the company of Muir, Mavor, & Coulson, Limited, was incorporated, and purchased from the firm of Muir, Mavor, & Coulson the plant in the Miller Street Station belonging to them. The new company also purchased ground in Little Hamilton Street, off John Street (City), and laid down plant for a general supply. The supply from the Miller Street Station was on the low-tension continuous-current system (100 volts), while the Little Hamilton Street supply, which was also conveyed by overhead wires, was on the high-tension alternating-current system (2,400 volts), transformed on the consumers' premises to 100 volts. The company, in 1890, applied for a Provisional Order to supply Glasgow generally, as also did the Corporation, but the company withdrew their application in favour of the application by the Corporation, and the latter was duly sanctioned by the Board of Trade under the title of "The Glasgow Corporation Electric Lighting Order, 1890," and the Act of Parliament confirming this Order received the Royal Assent on 14th August, 1890. Subsequently the Corporation agreed to purchase the company's undertaking for £15,000.

On 1st March, 1892, the Corporation entered upon possession of Messrs. Muir, Mavor, & Coulson's undertaking. The supply on the high-tension overhead system having only been sanctioned by the Board of Trade to continue until August, 1893, the Corporation proceeded forthwith to lay down a central generating station for low-tension supply. The Corporation, acting under the Gas Acts, having been constituted the

undertakers of the new department, the Gas Committee were entrusted with carrying out the scheme, and in 1891 active steps were taken for putting the powers obtained by the Corporation into execution.

The Corporation purchased ground in Waterloo Street for £8,000, and commenced to erect thereon a generating station in the Spring of 1892. They also, on the advice of Lord Kelvin, adopted the low-tension continuous-current three-wire system at 200 volts pressure, to save the cost of altering existing consumers' installations, which could be connected to the new system without exchanging the lamps.

On 25th February, 1893, the lighting of some of the public streets by arc lamps, supplied from high-tension continuous-current Brush dynamos, to which they were connected by long-series circuits, was publicly inaugurated, and on Saturday, the 22nd April following, the general supply for private lighting was switched on. In August, 1893, the John Street high-tension alternating plant was shut down, all the consumers being transferred to the new low-tension underground mains supplied from Waterloo Street.

Owing to the rapid growth of the undertaking, it soon became evident that the space occupied by the special and separate lighting plant in the Waterloo Street Generating Station would be required for extensions of plant to meet the demands of private consumers. The committee then decided to remove the Brush dynamos from Waterloo Street to John Street, and there to utilise them for street lighting purposes in connection with the engines originally put down by Muir, Mavor, & Coulson, Limited, the high-tension alternating-current dynamos having in the meantime been disposed of. The John Street Works, when reopened and utilised for the purpose of street electric lighting, only supplied about 100 H.P. Matters continued in this position until 1897, the plant at Waterloo Street being increased from time to time, until during that year the whole available space was fully occupied with boilers, engines, and dynamos to a total of 3,300 H.P., which at that time provided a small margin of reserve power.

The street lighting being so inconsiderable, it was decided to alter the arrangements so that these lights could be run from the same plant as the private supply in Waterloo Street, with a resultant saving in cost. The John Street plant was thus again shut down, and the whole of the electric lighting, both public and private, was carried on from Waterloo Street Works. The committee soon found the necessity for extensions, and in order to meet these and the increasing demand for the supply of current from so wide an area as was comprised between Glasgow Cross on the one hand and Park Circus on the other, two temporary accumulator sub-stations were erected, one in Tontine Lane, Trongate, and the other in Claremont Street. The object of these sub-stations was partly to avoid transmitting heavy loads through the mains during the longest lighting hours, a matter involving considerable loss at the low pressure of 200 volts, or a very large expenditure in extra heavy copper mains, and partly to relieve the maximum load upon the generating plant. The arrangement of working was to charge up the accumulators when both plant and mains were under easy load, and to discharge them during the two or three hours of the afternoon

or evening maximum load, the discharge current, of course, going to feed the local districts around each sub-station.

The committee then turned their attention to the question of purchasing sites for entirely new works, one for the north and another for the south side of the river; and during the year 1897 arrangements were made for the purchase of about $4\frac{1}{2}$ acres of ground at Port-Dundas, adjoining the Forth and Clyde Canal at Speirs' Wharf, and about two acres of ground close to Eglinton Toll, or St. Andrew's Cross, in Pollokshaws Road.

The works and whole undertaking of the Kelvinside Electricity Company were purchased and taken over by the Corporation in August, 1899.

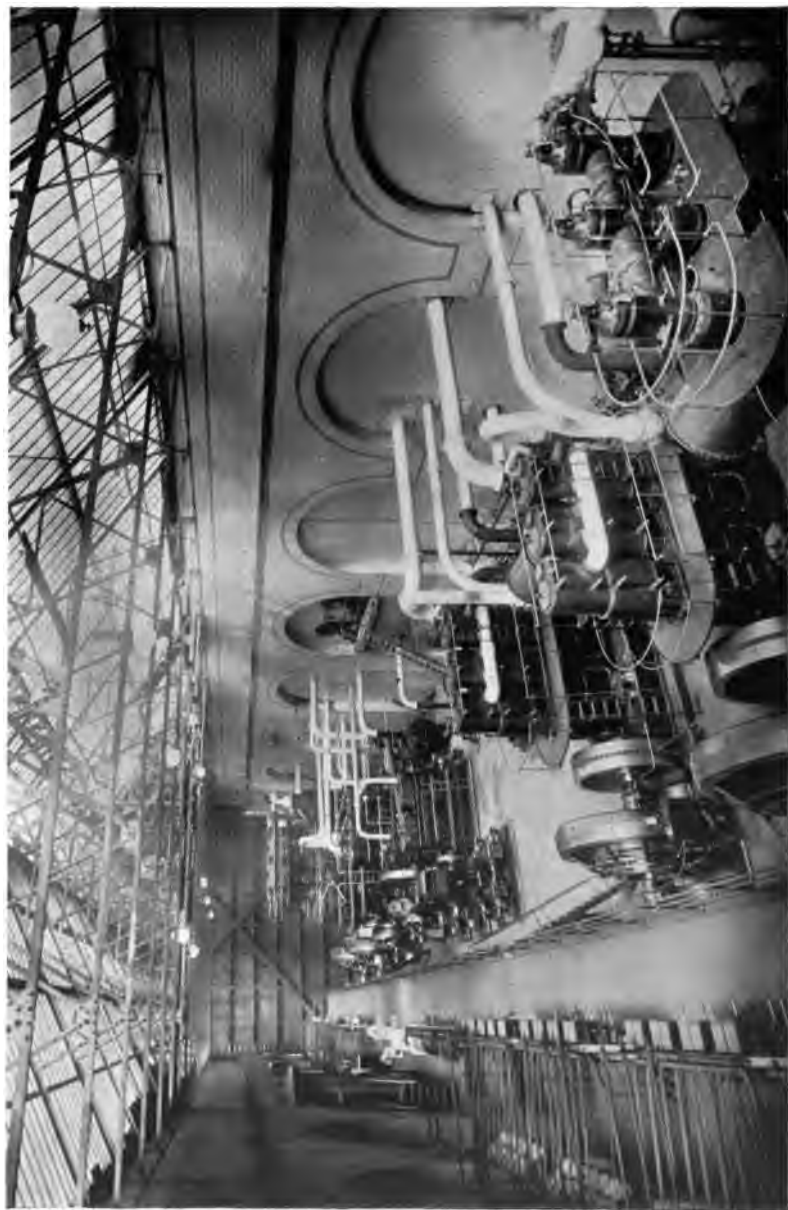
When the electric lighting supply was commenced by the Corporation probably no one had any idea of the magnitude to which the undertaking would so rapidly attain. The following tabulated statement shows at a glance the progress of the undertaking since the date of its inauguration in 1893, and there is no indication of any abatement in the demand for current in the near future. On the contrary, everything points to that demand increasing from year to year, and to the rate at which this increase is taking place being steadily maintained or even augmented. See page 123.

The demand for electric motive power is rapidly growing, and now amounts to over 6,000 H.P. in motors of all sizes, which are used for many different purposes.

The new Port-Dundas and Pollokshaws Road Works will be found worthy of a visit. The former contains engines and dynamos of both American and British manufacture, and of both high-speed and low-speed types, and in various sizes from 200 H.P. to 2,400 H.P. each unit. The largest engines were built by Messrs. Willans & Robinson, and the dynamos by the Westinghouse Company. The remaining engines are by the Ball and Wood Company, Messrs. Matthew Paul, Messrs. Mirrlees & Watson, Messrs. Belliss & Morcom, and Messrs. Willans & Robinson, and the dynamos by the Walker Company, the Schuckert Company, Crompton & Co., and the British Thomson-Houston Company. The condensing plant is all driven by electric motors, the air pumps being of Edwards' patent design. The switchboards and recording gauges are of considerable interest, being specially designed for the purpose, and containing some departures from ordinary practice. They have been constructed by Kelvin & James White, the Holland House Manufacturing Company, Messrs. Meehan & Sons, and Messrs. Laing, Wharton, & Down. They are mostly, therefore, of local production.

The total cost of the electricity works of the Corporation, including mains, up to 31st May, 1904, has been approximately £1,150,000. This expenditure does not, of course, include the cost of the Corporation tramways electrical system, which is an entirely separate undertaking.

Large extensions are now in progress at Port-Dundas, where a second third of the whole design for the buildings is being erected. This will complete the northern end of the generating station, and will contain another chimney some 230 feet in height. After the most careful investigation, it has been decided to put in two steam turbines



PORT DUNDAS ELECTRICITY WORKS.—ENGINE AND DYNAMO HOUSE.

STATEMENT OF ELECTRICITY GENERATED, SOLD, &c.

Year Ending 31st May.	Quantity Generated.	QUANTITY SOLD.				Quantity used on Works.	Total Quantity Accounted for.	Number of Consumers.	Number of Public Lamps.	Total Maximum Supply Demanded.
		Private Consumers.	Public Lamps.	- By Contract.	Total Sold.					
	B.T., Units.	B.T., Units.	B.T., Units.	B.T., Units.	B.T., Units.	B.T., Units.	B.T., Units.			Kilowatts. 8 c.p. Lamps.
1893	408,529	262,218	25,494	None.	287,712	13,975	301,687	108	71	790 = 24,687
1894	854,766	543,178	159,070	None.	702,248	13,326	715,574	378	102	1,684 = 52,625
1895	1,022,730	714,362	186,925	None.	901,287	20,828	922,115	586	103	2,080 = 65,312
1896	1,279,687	886,606	204,353	None.	1,090,959	23,898	1,114,857	855	112	2,638 = 82,438
1897	1,729,483	1,287,418	210,424	None.	1,497,842	35,727	1,533,569	1,090	112	3,366 = 105,188
1898	2,619,019	1,885,902	228,134	None.	2,114,036	55,276	2,169,312	1,437	119	4,800 = 150,000
1899	3,401,731	2,566,016	258,334	None.	2,824,350	67,435	2,891,785	1,858	227	6,114 = 191,062
1900	5,226,818	3,788,795	461,874	None.	4,250,669	155,294	4,405,963	2,852	265	7,732 = 241,625
1901	8,254,146	6,290,819	523,172	None.	6,813,991	626,151	7,440,142	4,031	348	11,787 = 368,342
1902	11,122,606	8,384,696	884,839	12,508	9,282,043	829,713	10,111,756	5,374	500	15,722 = 491,306
1903	13,197,612	10,419,488	1,064,404	17,432	11,501,324	745,801	12,247,125	7,013	719	20,183 = 630,708
1904	17,070,488	13,604,199	1,460,780	42,766	15,107,745	978,393	16,086,138	9,324	814	25,762 = 805,088

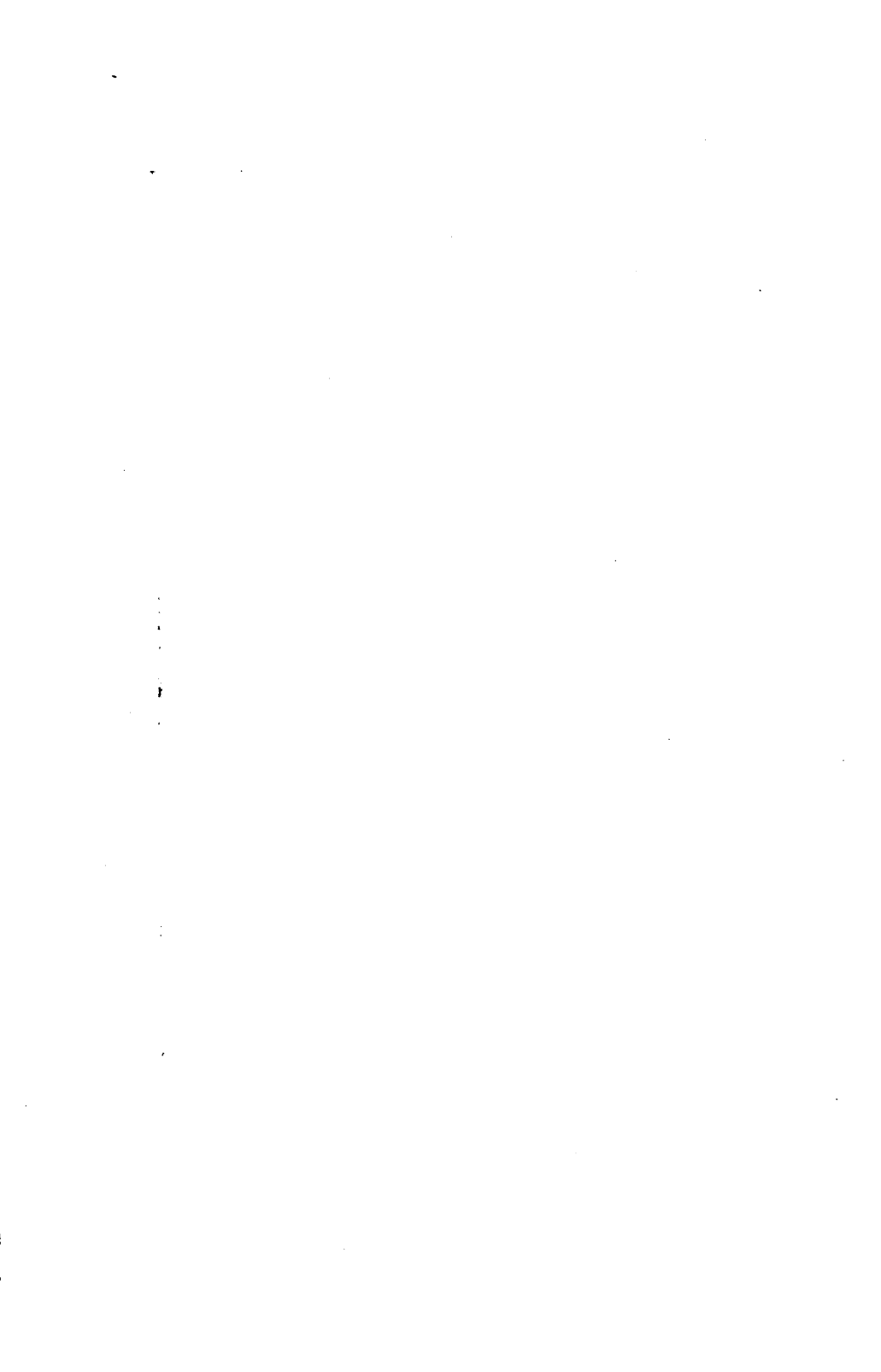
of 3,000 kilowatts capacity each, and orders have accordingly been placed for these turbines with Messrs. Willans & Robinson, of Rugby, while the alternators, which will be of the three-phase type, working at 6,500 volts, and at a periodicity of 25 cycles per second, are being constructed by Messrs. Dick, Kerr, & Co. at Preston. The surface-condensing plant, which is a very important matter with steam turbines, will be immediately below them, so as to make the connections as short as possible, and is being constructed by Messrs. W. H. Allen, Son, & Co., of Bedford. The switchboard for the control and measurement of high-tension currents is a very extensive affair, as experience has shown the necessity for the utmost care in designing and constructing this part of the electrical equipment. The order for this portion of the work has been placed with Messrs. Witting, Eborall, & Co. The boilers for this extension are to be, like those already in use, of the Babcock Company's make, but of the largest size yet constructed, having a grate area of 100 square feet and a heating surface of 6,182 square feet each, the working steam pressure being 200 lbs. per square inch, and each boiler being fitted with superheaters to give about 200 degrees of superheat. Space is provided for economisers, which will be put in in due course.

The high-tension current generated by the new turbo alternators will be taken to various sub-stations in the city, but principally at present to the sub-station in Waterloo Street, which is the original generating station, from which, however, all the steam and generating plant has now been removed. Motor generators, which are being supplied by the Electrical Company, will be placed in these sub-stations, by means of which the high-tension three-phase current will be converted into continuous 500-volt current on the three-wire system supplied at 250 volts each side. It is not necessary in the present circumstances of demand to utilise these sub-stations, except in the dark winter months, and then only on the afternoon shifts, to meet the excessive peak load in the city.

As regards St. Andrew's Cross Electricity Works, there is no need to extend the buildings, as they were practically completed in the first instance, but preparations are now being made to put in a steam turbine of 1,400 kilowatts capacity, which also is being constructed by Messrs. Willans & Robinson. The turbine will drive two continuous-current dynamos, giving a pressure of 500 to 600 volts each, which are being constructed by Messrs. Siemens Brothers & Co. at Stafford. The boilers in this generating station will also be of the Babcock & Wilcox type, exactly like those already installed. They will each have a grate area of 76 square feet and a heating surface of 4,020 square feet, the steam pressure being 200 lbs. per square inch, and the superheaters being constructed to give 200 degrees of superheat. The new boilers, however, will be erected with the special arrangement of boiler setting designed by Mr. H. W. Miller, of the Kensington and Knightsbridge Electric Lighting Company, Limited, in London. One boiler has already been erected with this arrangement of setting, and has proved most satisfactory in economical performance, in output, and in smokeless combustion. This one boiler may be seen at work on paying a visit to this station.



ST. ANDREW'S CROSS ELECTRICITY WORKS.—ENGINE AND DYNAMO HOUSE.



There being no canal or river from which water can be circulated for condensing purposes, it has been necessary to order cooling towers to be placed in the tanks over the boiler house, by means of which the water from the condensers connected with the turbine and the engines will be cooled. The order for one of these towers has been placed with Messrs. Richardsons, Westgarth, & Co., of Hartlepool, this being of the Koppel type, and two smaller ones have been ordered from Messrs. Klein & Co., of Manchester.

Up to the present time the supply and distribution of electricity throughout the city has been carried on practically by means of low-tension 500-volt continuous current throughout, with feeders radiating from the two separate stations. Last winter a departure was commenced upon by converting the old Waterloo Street Generating Station into a sub-station, and taking a temporary supply of high-tension current from the surplus plant of the Tramways Department, which is situated at Pinkston. Low-tension feeders are now also run from the Waterloo Street Sub-station, and it is intended before the coming winter to erect a similar sub-station on part of the Dalmarnock Gas-works, which are being superseded by the new gas-works at Provan. Low-tension feeders will also be laid from this sub-station for the supply of lighting and power in the east end of Glasgow.

Fully half the capital expenditure of the undertaking is, as is usually the case, for mains, though these are seldom given the attention which their great importance deserves. All the low-tension mains which have been laid by the Electricity Department in the city for some time past are of the triple-concentric type, some of them with lead sheathing, but all of them during the last two years or so with vulcanised bitumen sheathing. They are laid in wood troughs of ample size, and run in solid with pitch and asphaltic oil. Large manholes, measuring some 6 feet square and 6 feet deep, are placed at the feeding points within the city, and from these the distributing cables or mains radiate in all directions, each main being fitted with positive and negative fuses in the manhole. In districts where it can be arranged, section pillars above ground are now being used in place of the underground manholes. The whole arrangement has been most carefully systematised and standardised.

The number of meters at present connected to the mains is 9,324.

TRAMWAYS DEPARTMENT.

THE first tramway in Glasgow was constructed by the Corporation, and opened on 19th August, 1872. From 1872 to 1894 the lines were leased to the Glasgow Tramway and Omnibus Company. On 1st July, 1894, the Corporation commenced to operate the tramways as a municipal undertaking. The length of line, measured as single track, leased to the above

company extended to 60 miles. The total length now operated extends to 132 miles, and, in addition, 8 miles of track are leased from the Corporation of Govan, and are operated as part of the Glasgow system. Other $8\frac{1}{2}$ miles are at present in course of construction, and by our Provisional Order of this year powers have been granted for the construction of other $9\frac{1}{2}$ miles. This will make in all 158 miles of single track.

Of the total length of tramway made and authorised 62 per cent. is within and 38 per cent. outwith the municipal boundaries. The lines outside the city project into the burghs of Clydebank, Partick, Renfrew, Paisley, Pollokshaws, and Rutherglen, and into the counties of Lanark and Renfrew, to Bishopbriggs, Shettleston, Tollcross, Cambuslang, and Cathcart. Powers have also been obtained to extend the lines to Giffnock and Thornliebank.

These extensions into the outlying districts have all been made at the request of the communities concerned, and the Corporation of Glasgow have always acted with the fullest co-operation and support of all the burgh and county authorities.

The City of Glasgow, with the most of the places above mentioned, forms one community. The Corporation, in making arrangements for extensions of the tramway system, have always recognised this fact, and have, consequently, regarded the whole tramway system as one, giving the outside communities exactly the same tramway facilities as are enjoyed by the citizens of Glasgow.

Prior to 1894 the Tramways Committee considered the question of mechanical traction, and reported on various systems. The line, however, being in the hands of the lessees up to the last day of the lease, it was impossible to start with any other system than horse traction. In 1895 a committee was again appointed to go fully into the question. This committee finally reported in favour of the overhead system of electric traction. The Springburn line, extending to $2\frac{1}{2}$ miles of route, was equipped as a demonstration of this system, and the line opened on 13th October, 1898. So satisfactory in every way was this demonstration during the first two months' working that, on 28th December, 1898, it was decided to convert the whole of the tramways to the overhead system.

The equipment of the whole system was completed by the summer of 1901, and the last horse cars had disappeared by the end of April, 1902.

The power station is situated at Pinkston, on the Forth and Clyde Canal, and is one of the largest traction stations in Europe. It is bounded on one side by the canal, and is connected with both the Caledonian and North British Railways. The building is 244 feet in length by 200 feet in breadth, and the height of the walls is 88 feet. The boiler room, which forms the east bay, with a span of 84 feet, contains 16 Babcock & Wilcox boilers, each capable of producing 20,000 lbs. of steam per hour at a working pressure of 160 lbs. per square inch. The engine room, which forms the centre bay, contains four main engines, designed to work at 4,000 I.H.P., but which are capable of developing a maximum of 5,000. Two of the engines are of American make and two of British make. Each engine is directly coupled to a three-phase generator, designed for an output of 2,500 kilowatts at a pressure of 5,000 volts.

There are also two auxiliary engines of 800 to 1,000 horse-power, each coupled to a direct current dynamo. In the west bay are situated all the auxiliary plant.

From the feeder panels of the main switchboard in the power station four three-core cables are led to each of five sub-stations, which are situated in the different districts of the city. The five sub-stations are situated at Coplawhill and Kinning Park, on the south side of the river; Partick, in the west; Whitevale, in the east; and Dalhousie, near the centre of the city. The units in each of the sub-stations are all of the same size, each static transformer being 200 kilowatts, and each rotary converter 500 kilowatts.

When the Corporation took over the lines in 1894 almost the whole of the system had been previously relaid with steel girder rails, weighing 79 lbs. per yard. The Corporation introduced a heavier section, weighing 89 lbs., and since 1898 all the rails used, both in renewals and extensions, have been 100 lbs. per yard, and in 60-foot lengths. The rails are laid to a gauge of 4 feet 7 $\frac{1}{4}$ inches, on a bed of Portland cement concrete 6 inches in depth, and extending 18 inches beyond the outer rails.

The feeder system of cables is laid in ducts, which are placed in the centre of the street.

Throughout the whole system the trolley wires are supported in the centre of the track by means of span wires. In Great Western Road, from Kelvinbridge to Hyndland Road, the centre pole construction has been adopted. There are also a few centre poles on the Springburn route, and also on Glasgow Bridge. Wherever possible the span wires have been attached to the buildings on either side of the street by means of rosettes.

The workshops of the department are situated at Coplawhill, on the south side of the Clyde, about a mile from the centre of the city. These cover an area of 28,000 square yards. The ground in this locality has been in the possession of the Corporation for several centuries, and this portion was taken over by the Tramways Department from the Common Good at a valuation. The workshops consist of offices, stores, smiths' shop, sawmill, car-building shop, iron-working shop, car-repairing shop, paint shop, &c. All these departments are fully equipped with the most approved machine tools for making and repairing cars, &c. Nearly all the electric cars have been built in these workshops by the staff of the department.

There are in all nine depots for the accommodation of the electric cars. At each depot there is a roomy office for the accommodation of the traffic staff. The depot foreman has a store, workshop, &c., and every convenience for the cleaning and inspection of the cars. At all the depots there are kitchens, bath-rooms, &c. There is also, at several depots, a well-equipped gymnasium for the use of the men.

The department has now 681 electric cars, and arrangements are being made for building an additional number to cope with the increasing traffic.

When the Corporation started to operate the system in 1894 the fares were considerably reduced, and halfpenny fares instituted for half-mile stages. From time to time further reductions have been given, and the

average distances which can be travelled at the various fares are now as under:—

Fare.	Distance.
$\frac{1}{2}$ d.,	·58 miles.
1d.	2·30 "
$1\frac{1}{2}$ d.	3·48 "
2d.,	4·64 "
$2\frac{1}{2}$ d.,	5·80 "
3d.,	6·89 "
$3\frac{1}{2}$ d.	8·15 "
4d.,	9·09 "

During the year ending 30th June, 1894, the number of passengers carried by the lessees was 54,000,000. During the year ending 31st May, 1904, the number carried will exceed 187,000,000.

The following table shows the progress of the undertaking:—

Period (to 31st May).	Length of Track (single).	Average Cars, 16-hour day.	Car Mileage.	Passengers carried.	Receipts.	Average Receipts per car mile.
1894-5 (11 months)	64	170·97	5,192,031	57,104,647	£222,121 11 0	10·26
1895-6	65	227·66	6,932,650	86,462,594	328,827 8 8	11·38
1896-7	73	268·20	8,127,111	98,966,658	365,761 3 10	10·80
1897-8	73	280·96	8,483,012	106,344,437	389,216 9 6	11·01
1898-9	$81\frac{1}{2}$	305·85	9,071,640	118,775,668	433,128 0 6	11·46
1899-1900	$83\frac{1}{2}$	316·96	9,657,429	127,628,484	464,786 15 2	11·55
1900-1	88	322·02	9,847,545	132,557,724	484,872 17 10	11·82
1901-2	$103\frac{1}{2}$	365·41	12,615,021	163,678,190	612,826 2 4	11·66
1902-3	130	399·58	14,008,750	177,179,549	653,199 18 2	11·19

The total borrowing powers sanctioned by Parliament amount to £2,600,000, and by the Provisional Order of this year, which has just been passed by the Commissioners under the Private Bill Procedure (Scotland) Act, powers have been asked to borrow an additional £100,000. The amount of sinking fund which has been applied in reduction of debt amounts to £402,355 6s. 5d.

The capital expenditure as at 31st May, 1903, with the amounts written off for depreciation, was as under:—

	Gross.	Amount written off.	Net Amount.
Permanent Way,	£728,391 13 1	£201,470 1 5	£526,921 11 8
Electrical Equipment of Line,	531,612 5 3	74,463 14 5	457,148 10 10
Ground,	110,142 0 5	...	110,142 0 5
Buildings and Fixtures,	424,171 11 0	61,597 6 11	362,574 4 1
Power Station & Sub-stations,	378,464 3 11	37,032 0 1	341,432 3 10
Workshop Tools, &c.,	21,760 9 6	8,236 5 5	13,524 4 1
Cars,	178,071 8 3	27,834 8 3	150,237 0 0
Electrical Equipment of Cars,	156,416 0 0	24,450 0 0	131,966 0 0
Miscellaneous Equipment,	18,399 16 11	6,676 4 0	11,723 12 11
Office Furniture,	3,952 12 8	1,941 4 11	2,011 7 9
Lease of Govan Tramways,	4,057 2 4	1,046 7 8	3,010 14 8
Parliamentary Expenses,	13,975 5 0	...	13,975 5 0
Preliminary Expenses,	4,845 5 9	...	4,845 5 9
	£2,574,259 14 1	£444,747 13 1	£2,129,512 1 0

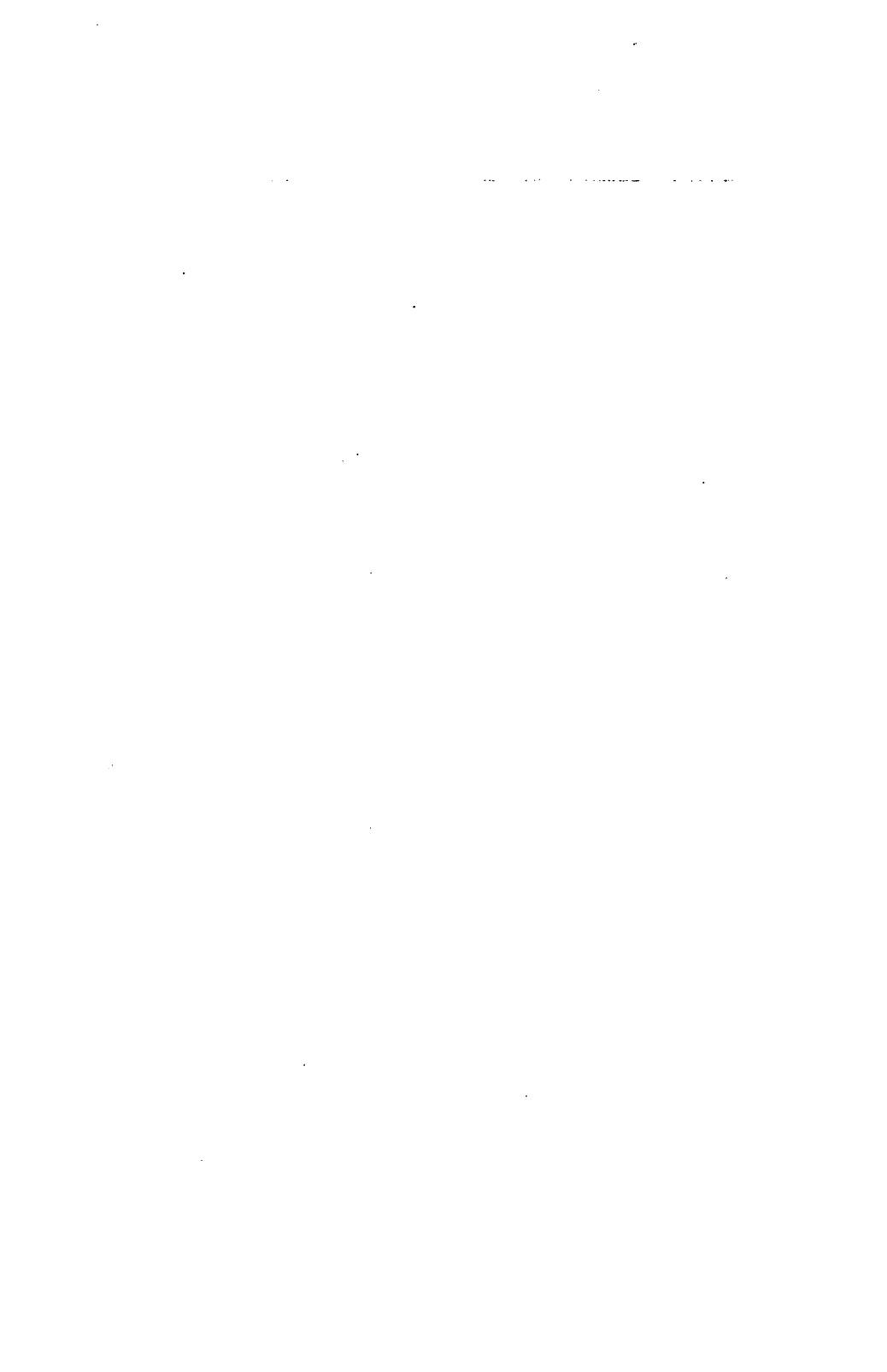


TRAMWAY OVERHEAD WIRES.—GREAT WESTERN ROAD.



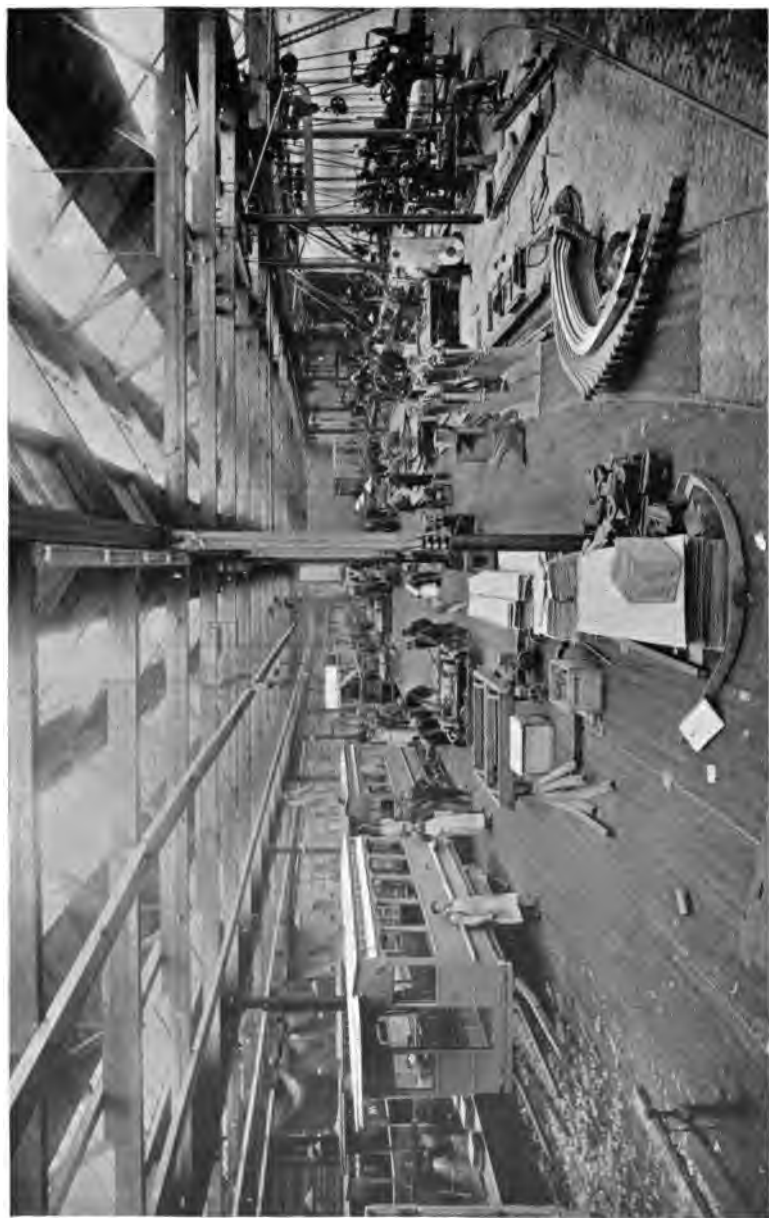


CORPORATION TRAMWAYS.—PINKSTON POWER STATION—INTERIOR.





CORPORATION TRAMWAYS—WHITEVALE SUB-STATION.



ELECTRIC CAR CONSTRUCTION WORKS, COPLAWHILL.

During the period of horse traction, from 1894 to 1901, the Corporation were enabled to write down the horse-traction equipment, and also lay aside considerable sums for the renewal of the permanent way and to accumulate a large reserve fund. The result was that there was sufficient surplus revenue to renew nearly the whole of the permanent way, and to write off all the old horse-traction plant not required for the new electric system. The capital account, therefore, now includes nothing but the cost of the electric system.

The following is an abstract of the income and expenditure account for year to 31st May, 1903, with the application of the surplus on the year's working:—

REVENUE ACCOUNT.

Income.

						Av. per Car Mile.
Traffic Receipts, ...	...	...	£653,199	18	2	11·19
Other Receipts, ...	...	...	3,372	9	9	·06
			£656,572	7	11	11·25

Expenditure.

Power Expenses, ...	...	...	£20,112	10	5	·35
Traffic Expenses, ...	...	...	176,532	17	11	3·02
General Expenses, ...	...	...	44,014	8	5	·75
Maintenance, ...	...	...	63,654	18	4	1·09
			£304,314	15	1	5·21
Balance carried to Net Revenue Account, ...	...	...	352,257	12	10	6·04
			£656,572	7	11	11·25

NET REVENUE ACCOUNT.

Balance from Revenue Account, ...	...	...	£352,257	12	10	6·04
Renewal and Depreciation, ...	...	...	£127,555	7	10	2·19
Rent of Govan Lines, ...	...	...	5,059	2	8	·09
Interest on Capital, ...	...	...	61,072	3	9	1·04
Sinking Fund, ...	...	...	43,294	0	7	·74
Common Good, ...	...	...	15,000	0	0	·26
			£251,980	14	10	4·32
Surplus carried to Appropriation Account, ...	...	...	100,276	18	0	1·72
			£352,257	12	10	6·04

APPROPRIATION ACCOUNT.

Surplus from Net Revenue Account,	£100,276	18	0
<i>Deduct—</i>			
Additional Payment to Common			
Good,	£10,000	0	0
Additional Depreciation,	65,000	0	0
General Reserve Fund,	25,276	18	0
	<u>£100,276</u>	<u>18</u>	<u>0</u>

The staff of the Tramways Department now numbers 3,500. Of this number 3,020 are members of the Departmental Friendly Society. The weekly contribution per member is 6d., to which the Tramways Committee add 4d., including 1d., which is placed to the credit of the superannuation fund. The weekly aliment to members who are off work through illness is 15s. for the first six months, and 10s. for the second six months.

The amount at the credit of the superannuation fund is now £9,591 13s. 6d. This fund comes into operation in 1911, and is for the benefit of members who, after long service, have become unable for work.

MARKETS, SLAUGHTER-HOUSES, AND FOREIGN ANIMALS WHARVES.

THE Markets at present belonging to the Corporation of Glasgow are—

- (1) The Bazaar.
- (2) The Cheese Market.
- (3) The Bird and Dog Market.
- (4) The Old Clothes Market.
- (5) The Cattle Market.
- (6) The Slaughter-houses—
 - (a) Moore Street;
 - (b) Scott Street;
 - (c) Victoria Street.
- (7) The Dead Meat Market.
- (8) The Fish Market.
- (9) The Foreign Animals Wharves.

Of these, the first four form part of the General Department of the Corporation, and as such are administered by a committee popularly known as the Bazaar Committee, which is also entrusted with the oversight of the public halls, turret clocks, and city timepieces belonging to the Corporation.

1. *The Bazaar* is the modern representative of the ancient vegetable market of Glasgow, and now occupies a site bounded by Ingram Street, Candleriggs, Bell Street, and South Albion Street. The Bazaar was laid out in 1817, and then embraced an area of 2,377 square yards. Sub-



SLAUGHTER-HOUSE.

sequent additions have increased the accommodation, till now the Bazaar proper covers 7,879 square yards, divided into 58 stances. Previous to 1886 the business done in the Bazaar was of a different character from that which has since been carried on there. In its early days the stalls of the Bazaar were by no means restricted to dealers in fruit and vegetables. They were occupied by retail greengrocers, dealers in eggs, butter, cheese, poultry and game, and by second-hand booksellers, and there were also toy shops and undefined stores. Owing, however, to the establishment of large provision premises in the immediate neighbourhood of the Bazaar, and the large increase of retail shops throughout the city, miscellaneous trading in the Bazaar soon ceased.

In other respects also the Bazaar business has changed with the changing times. Retail trade is still carried on, but it is on the most insignificant scale, and steadily the tendency is towards dealing on a wholesale basis. The bazaar is now recognised as the principal market for the sale of fruit and vegetables in the West of Scotland, and nearly all the stance-holders, of whom there are about two dozen, hold auctioneers' licences, and dispose of a large portion of their merchandise by auction-room methods. In summer, during the height of the fruit season, auction sales are held daily, beginning at nine o'clock, and during the winter months such sales are held only thrice a week, beginning at eleven o'clock in the forenoon. With increasing trade and restricted accommodation, there has arisen a strong competition for stances in the Bazaar, which has therefore become a highly remunerative property to the common good of the city. Within ten years the receipts for stances have increased from a little more than £2,000 to over £3,300. The stances are let on monthly occupancies, with rents payable in advance, but the Corporation reserves the right, in lieu of rent, to charge such dues on goods as they may fix. The Corporation are at present seeking power from Parliament to extend the Bazaar under a scheme which includes the appropriation of part of the *solum* of South Albion Street and the acquisition of the Central Police Office. This scheme, if carried out in its entirety, would give an increased space of 3,576 square yards, and would involve an expenditure of about £80,000.

2. *The Cheese Market*, devoted to the wholesale cheese trade, is a portion of the Bazaar entirely distinct and divided off from the fruit and vegetable stances. It has its own entrance in South Albion Street, and on that side, including galleries carried round three sides of the north division of the vegetable market, has a floorage of 1,500 square yards. The Cheese Market is open only on Tuesdays, Wednesdays, and Fridays, and the business is entirely wholesale. The market is, indeed, the modern representative of the ancient cheese market of Glasgow, which was held on certain days under magisterial supervision, and in which dues were charged according to the quantity offered for sale. The cheese sold is entirely of home manufacture, principally the kinds known as Cheddar, and Dunlop from Ayrshire. There is no allocation of stances or positions to dealers, and any one who has cheese to sell may have it placed on the racks in the market on payment of the prescribed dues. A rent charge is made at the rate of 4s. 6d. per ton for all cheese brought into the market. For a payment at that rate the cheese is weighed and allowed

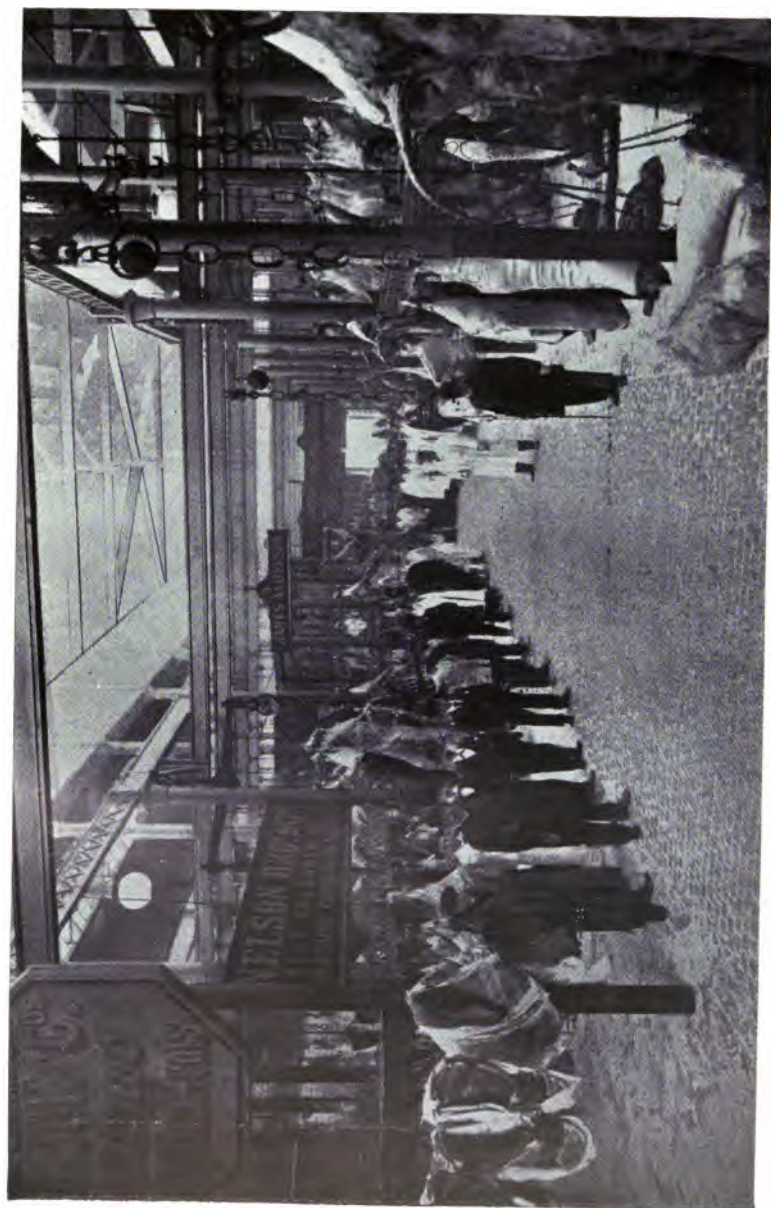
to remain over two market days, but if not sold and removed within that time an additional charge of 1s. per week or part of a week is levied on every ton weight. Goods sold must be taken away within forty-eight hours; if left longer, a charge of 2s. per ton for every day or part of a day after the expiry of the forty-eight hours is made.

3. *The Bird and Dog Market* is situated in Jail Square, opposite Glasgow Green, and covers an area of 720 square yards. It was opened for business in December, 1876, but prior to that date the market had been successively carried on in premises in Cochrane Street and Ingram Street. It is rented to a tacksman for £112 per annum. The market is held on Monday, Wednesday, and Saturday, and is divided into a wholesale and a retail department. The wholesale side is set apart for dealers who have stock to dispose of to stancholders or other retailers. A charge of $\frac{1}{2}$ d. for each animal exposed in the market is made, and buyers other than stancholders pay 1d. for admission to the wholesale market. In the retail department, stances, 6 feet wide by $9\frac{1}{2}$ feet high are let for not more than 3s. per week, and casual holders are charged 1d. per day for each animal they bring in and $\frac{1}{2}$ d. for each cage space they occupy. Cages are supplied in the market when necessary for $\frac{1}{2}$ d. per day.

4. *The Old Clothes Market* in Greendyke Street, an institution which exists for trafficking in old clothes, offers a very curious example of magisterial supervision. The market is really an outcome of purely humanitarian care for the very humblest stratum of the population. The present market was opened in July, 1875, and occupies a floor area of 2,380 square yards. Prior to 1900 the market was rented to a tacksman, but in May of that year the Corporation took advantage of the expiry of the tacksman's lease to assume the control of the market, and to place it under the charge of the superintendent of the Bazaar. The stances in the market are let at a sum of not more than 5s. per day, and 1s. per day for the use of a lockfast store. Shopkeepers and retail dealers who have no stance or store in the wholesale market are required, when purchasing, to pay 6d. per day, and every person who enters the market with goods for disposal is liable to be charged 1d. The market is open every day at nine o'clock, closing in summer at eight, in winter at seven, and on Saturdays throughout the year at ten o'clock.

Prior to 1895 the markets after mentioned, viz., the Cattle Market, the Slaughter-houses, the Dead Meat Market, and the Fish Market, were controlled by the Corporation in their capacity as Markets Commissioners, acting under the Glasgow Markets and Slaughter-houses Act, 1865, but in that year (1895) an Act was passed unifying the several Corporation departments and creating the Glasgow Corporation (Markets) Department.

5. *The Cattle Market*.—After successive changes of site, the Cattle Market was removed in 1818 to its present site in the east-end of the city. It has from time to time been extended, and now covers an area of 42,439 square yards, a large proportion of which is roofed over. It provides accommodation for showing for sale about 1,900 cattle and 15,000 sheep in pens, and at the same time 1,000 cattle can be kept loose in sheds and 160 milk cows fed in byres within the market. *En suite* with the Cattle Market there is a Horse Bazaar, occupying an area of



MEAT MARKET.

980 square yards, with the necessary stables for putting up 97 horses. The slaughter-houses attached to the market extend over 13,695 square yards, and the Dead Meat Market, erected under the powers of the 1877 Act and opened for trade in 1879, covers an area of 4,256 square yards. For many years the markets accommodation, especially the slaughter-house portion, has not at all been commensurate with the demand made upon it, and it is at present being reconstructed on more modern lines. The improvements, when effected, will greatly add to the lairage of the slaughter-house accommodation, provide facilities for the scientific inspection of carcasses, and otherwise bring the resources and accessories of the market fully abreast of the most completely equipped institutions of the kind in the kingdom or on the Continent.

The principal cattle market day is Wednesday, but the market is open for business every day of the week. Under Act of Parliament, the tolls leviable are—For oxen, cows, bulls, and heifers, per head, 9d.; for sheep and lambs, per head, 1d.; for calves, 2d.; for swine and goats, 3d. In the Horse Bazaar the rates are—For animals over thirteen hands high, 6d.; and under thirteen hands, 3d. In the year ending 30th May, 1904, there were exposed for sale in the market 67,899 cattle, 198 calves, 357,456 sheep and lambs, 4 goats, 5,277 swine, and 17,120 horses.

6. *Slaughter-houses*.—There are at present three public slaughter-houses in the city, viz., Moore Street, at or near the Cattle Market, in the eastern district; Scott Street off Dobbie's Loan, in the northern district; and Victoria Street, in the southern district. But as soon as the contemplated additions to the accommodation at Moore Street shall have been carried into effect, it is intended to concentrate the whole of the business there. The sheds and yards at Moore Street presently provide accommodation for dealing with 560 cattle, 1,500 sheep, and 1,200 pigs at one time; and the dues payable on animals killed in the public abattoirs are—For oxen, 9d. per head; for calves, sheep, and goats, 1½d. each; for lambs, ¾d.; and for pigs, 1s. The following comparison between the number of animals slaughtered in 1876 and 1903 is interesting, viz. :—

	Oxen.	Calves.	Sheep.	Lambs.	Pigs.	Goats.
1876, ...	57,924	1,741	175,060	43,016	9,315	17
1903, ...	60,977	2,310	214,175	64,087	51,116	16

7. *The Dead Meat Market* in Moore Street was opened in 1879 as a necessary outcome of the successful inauguration of the ocean traffic in carcasses during the previous decade. The facilities offered by the Dead Meat Market have exercised a marked influence over the retail butcher trade in the West of Scotland. The market may now be regarded as the central depot of the wholesale meat business, and the butchers, instead of dealing in live animals, buy from the exposed carcasses such portions and qualities as suit their requirements, and thus the trade is better and more economically supplied, and is more expeditiously distributed than under the old system. The market covers an area of 4,246 square yards, consisting of 53 stances, let weekly at the rate of ¼d. per square foot per week. An ordinary stance contains about 480 feet, and can accommodate 24 cattle and 60 sheep. In addition, dues are levied on

carcases at the following rates, viz.:—For oxen, 6d.; for fat calves, 3d.; skink calves, 1d.; sheep and lambs, 1d.; and pigs, 2d. There is also exigible for weighing meat a toll at the rate of $\frac{1}{4}$ d. per hundredweight or part thereof. The following comparison of the number of carcasses dealt with during the first year of the market, viz., 1880, and during 1903 is suggestive of the great strides which have been made in the interval, viz.:—

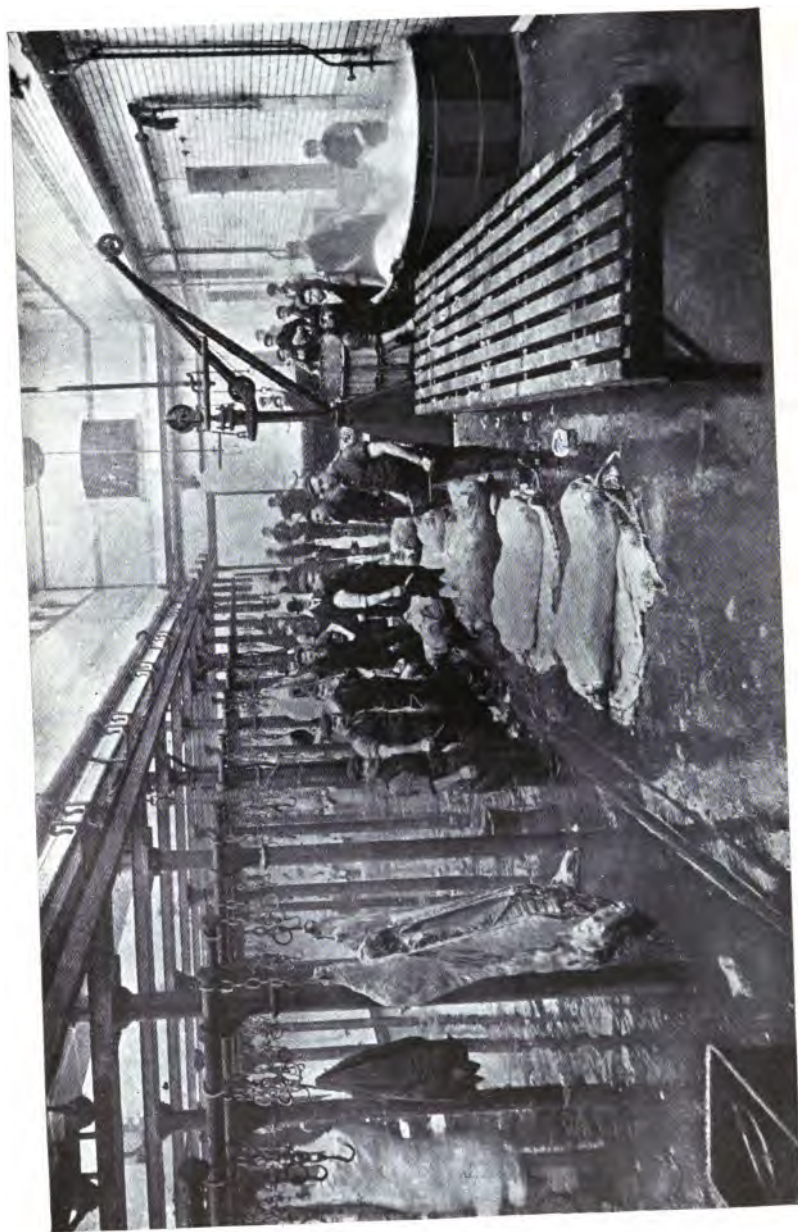
	Cattle.	Sheep.	Lambs.	Pigs.	Calves.
1880, ...	42,434	68,007	10,275	5,416	199
1903, ...	76,978	157,828	38,579	15,814	2,176

8. *The Fish Market*, situated by the side of the river between East Clyde Street and Bridgegate, covers an area of upwards of 2,000 square yards. Nominally it is divided into a wholesale and a retail department; but while it possesses conveniences for retail dealers, there is scarcely any retail business done in the market. The revenue of the market is derived from the renting of stances, of which there are 47, and from dues on goods brought into the market by dealers who are not stanceholders; but the latter source of income has completely dried up, showing that the whole trade is in the hands of the established dealers. The rents levied for stances are at the rate of 4s. 6d. per annum for each square foot of space occupied, payable weekly in advance; and casual dealers getting the use of a stance pay 4d. for each box or barrel of fish they bring into or buy within the market. During 1883 (the first year for which statistics are available), 213,621 packages of fish passed through the market, while in 1903, 1,105,901 packages passed through the market. An extensive addition is presently being made to the market.

9. *Foreign Animals Wharves*.—Under the Contagious Diseases (Animals) Act, 1878, the Corporation are the local authority having the control of the foreign cattle trade at the port of Glasgow. The local authority are also, under the same Act, entrusted with the duty of dealing with the outbreaks of contagious diseases among animals, with compensating owners for the loss of animals, and with the levying of rates to meet such compensation allowances.

Under the powers conferred by the Act of 1878, the Corporation erected in 1879, at Yorkhill, on the south side of the river, the first foreign animals wharf in Scotland. The building cost £3,500, and had accommodation for 120 head of cattle. From time to time alterations and additions were made, until in 1894 the local authority carried out an entirely new scheme of reconstruction of the wharf at a cost of almost £50,000. The wharf now covers an area of 23,596 square yards, and provides slaughtering accommodation of the most approved description, including spacious chill rooms, in which meat can be stored and preserved in perfectly sound condition for any length of time.

The wharf at Yorkhill is reserved exclusively for foreign stock subject to slaughter at port of landing. In 1879 also the Corporation provided a landing-place at Plantation, on the south side of the river, for foreign stock not subject to slaughter, which comes principally from Canada. The accommodation there is capable of providing for 1,500 cattle and sheep, and cost about £4,000. In 1886 provision was made at Shieldhall,



PIG KILLING.

also on the south side of the river, for 2,000 cattle and 6,000 sheep, at a cost of £27,000. This latter wharf is at present unoccupied owing to the orders of the Board of Agriculture that all foreign animals landing in this country must be slaughtered at the port of landing, so that all foreign stock for Scotland must now be discharged at the Yorkhill wharf.

The following table shows the number of foreign animals landed in Glasgow during the years 1880, 1885, 1890, 1895, and 1900:—

IMPORTATION OF LIVE ANIMALS—CATTLE, CALVES, SHEEP, AND PIGS—
FROM THE UNITED STATES, CANADA, SOUTH AMERICA, FRANCE,
SPAIN, AND IRELAND.

		Cattle.	Calves.	Sheep.	Pigs.
1880,	...	7,460	4	1,677	407
1885,	...	39,642	18	10,514	73
1890,	...	66,397	50	1,301	—
1895,	...	48,024	1	56,484	58
1900,	...	48,421	—	26,023	—

The great increase in the importation of frozen and chilled meat accounts for the decrease in live stock.

THE CORPORATION TELEPHONE SYSTEM.

THE telephone question was first discussed by the Corporation in February, 1893, when a special committee was appointed to consider and report upon the Treasury minute of May, 1892.

Acting on the recommendation of this committee, the Corporation resolved, on 3rd August, 1893, to apply to the Postmaster-General for a license to construct and work a telephone exchange within the city limits. In adopting this policy the Corporation were influenced by the notorious inefficiency and excessive cost of the existing telephone service, and the need of providing the commercial community with something both better and cheaper. It was also deemed imperative that the exclusive control of the streets should be preserved to the Corporation.

Correspondence with the Postmaster-General ensued for some two years, and the Corporation gave evidence before a Select Committee of the House of Commons in favour of granting licenses to local authorities. But no result was attained until, in 1897, the Treasury determined to hold a local investigation in Glasgow. Sheriff Jameson, as Royal Commissioner, presided, and after hearing voluminous evidence, extending over eleven days, reported that, on the whole, the grant of a license to the Corporation would be the best solution of the difficulty. But the Postmaster-General still declined to grant a license, and on 10th May, 1898, a second Select Committee of the House of Commons was appointed to inquire whether telephones were of such general importance as to justify their supply being undertaken by local authorities. The Glasgow Corporation gave evidence before this Committee, which reported that a

general, immediate, and effective competition by either the post office or local authorities was necessary. On 29th August, 1898, the Corporation renewed their application for a license, this time to cover the whole of the Glasgow telephone area as well as the city proper. After further correspondence the Postmaster-General, on 23rd September, 1898, informed the Corporation that he was now prepared to grant a license provided they obtained Parliamentary powers to construct and work a telephone exchange. The Corporation accordingly presented a Bill in Parliament, but before it reached Committee stage Mr. Hanbury introduced the Telegraphic (Telephonic Intercommunication) Bill, which, on 1st August, became law under the title of the Telegraphs Act (1899). As soon as this Act was passed the Corporation once more applied for a license, which was ultimately granted on 1st March, 1900, for the whole of the Glasgow telephone area, which embraces portions of four counties, Lanark, Renfrew, Dumbarton, and Stirling, and covers approximately 143 square miles. At the Corporation's own desire the license was made terminable on 31st December, 1913.

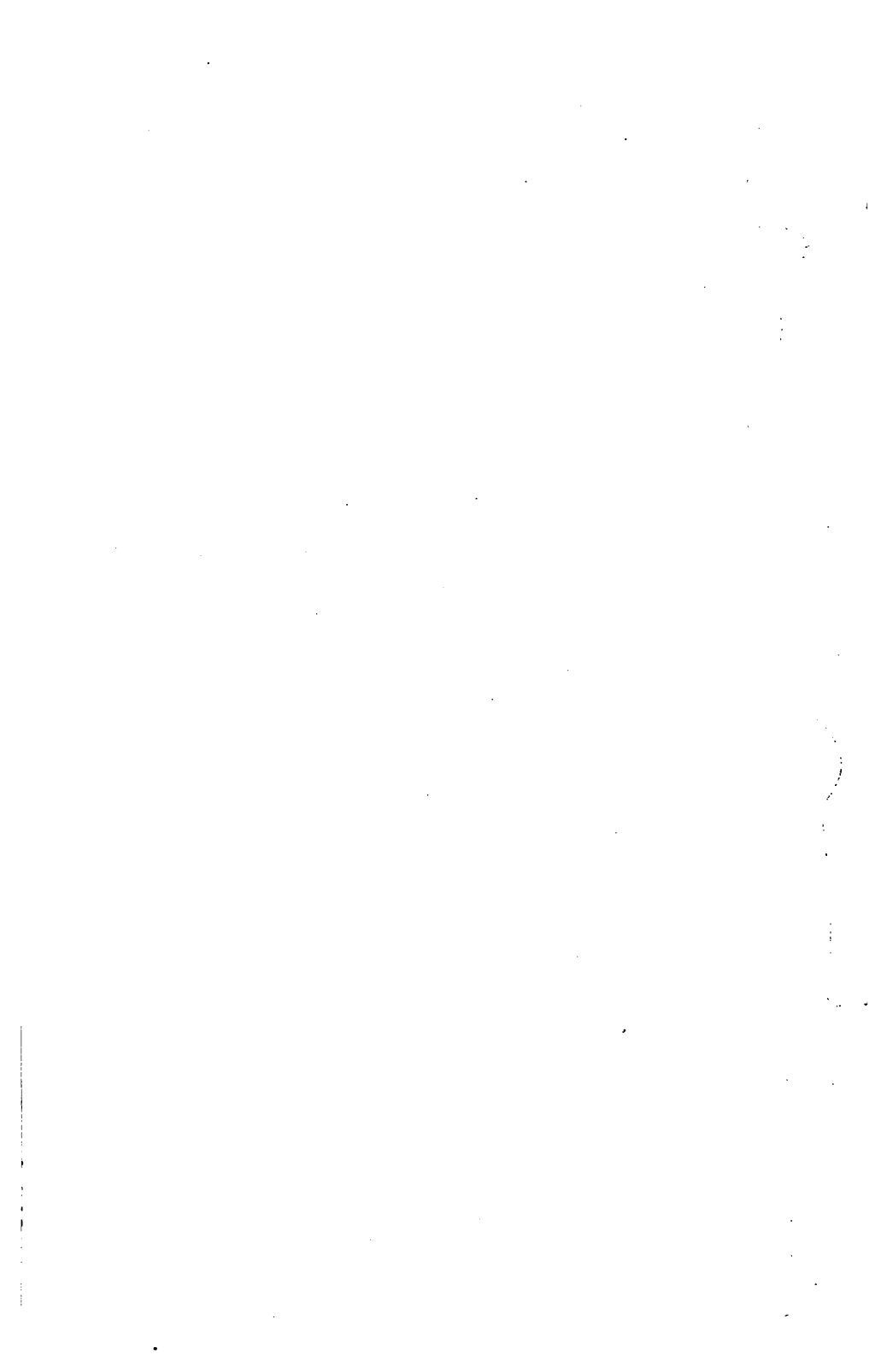
The Telephone Committee of the Corporation, acting under the presidency of ex-Bailie James Alexander, who had long been identified with the movement, at once took steps to organise a Telephone Department and to give effect to the license. Application for leave to borrow £120,000 was made to the Secretary of State for Scotland, and promptly granted. Mr. Alfred R. Bennett, M.I.E.E., who had taken a prominent part in the prolonged struggle for telephonic emancipation, was appointed general manager and engineer; premises were leased at Castle Chambers, Renfield Street, for a central exchange and offices, and arrangements made for sub-exchanges at Hillhead, Bridgeton, Springburn, Govan, Strathbungo, Maryhill, and Kinning Park. The Telephone Committee adopted two tariffs, which subscribers may select at their option. The first is £5 5s. per annum, and covers an unlimited service over the whole extent of the telephone area; the second is £3 10s. per annum, and 1d. for each call made, payable by the caller only, also applicable over the whole of the area. Latterly party line systems were introduced whereby a subscriber joining with another was afforded unlimited telephone supply at £4 4s., or where a group of four subscribers were formed the charge is £3 3s. each subscriber.

The original scheme was for 5,250 completed lines with skeleton provision for a second 5,250, but the demand for Corporation telephones has been so brisk that it has been deemed judicious to lay cables containing a large margin of spare wires for the use of prospective subscribers, and to extend the switch-room accommodation to about 20,000 lines.

Corporation wires are laid entirely underground in the centre of the city, thus securing perfect immunity from the effects of storms. Further afield, except in the residential suburb of Pollokshields, where everything is underground, the spurs into subscribers' premises are usually overhead, although the main routes are always carried under the streets.

The work of construction was commenced in July, 1900, and the operating service began at the central switch-room on the 28th March, 1901. Intercourse with the Government trunk lines was established on June 2nd, 1901, the Corporation system on that day being placed in







communication with all other telephone exchanges in Great Britain and Ireland.

The system has rapidly developed since that time, and there are now no fewer than nineteen switch-rooms in operation throughout the Glasgow telephone area, viz., at Renfield Street, Hillhead, Bridgeton, Kinning Park, Queen's Park, Maryhill, Springburn, Govan, Shettleston, Clydebank, Rutherglen, Cambuslang, Kirkintilloch, Stepps, Clarkston, Milngavie, Bearsden, Duntocher, and Balmore.

The annual report, being the third report of the department, for the year ending 31st May, 1904, showed that the capital expenditure stood at £320,000, and the annual revenue £49,000. After paying all working charges, including royalty, interest, and sinking fund, the balance was £3,650. This, added to the balance from the previous year, making, in all, £5,743, has been carried to a general depreciation fund.

The percentage of net revenue to capital expenditure was 15·48 per cent., while the provision against the future in the form of sinking fund and depreciation equalled 4·67 per cent. of the total capital expenditure. At the date above mentioned there were 11,405 stations in operation, together with 627 junction lines between exchanges. The traffic through the exchanges was at the rate of thirty-seven million messages per annum. There were 235 public telephones throughout the area. The underground system of the department includes 140 miles of pipes and 204 miles of cables, the mileage of underground wires being 17,597 miles. The pipes laid are capable of accommodating 36,000 wires. At present only one-third of this capacity is utilised.

THE FIRE BRIGADE.

THE cause which led up to the formation of an organisation for the extinction of fires was the disastrous fire of 17th July, 1652, which destroyed nearly one-third of the city, rendered 1,000 families homeless, and resulted in a loss of £100,000. This loss was too great for the town to bear, and the citizens were under the necessity of applying to other towns for relief.

The earlier efforts in the direction of fire extinction, when contrasted with the elaborate, extensive, and, it may be added, expensive organisation of to-day, appear to be crude, slow, and ineffective. It is unnecessary in this article to trace the fluctuating history of the Fire Department.

Nothing further seems to be called for than to indicate the present position and scope of a department upon the efficiency of which so much depends. The following summary may prove interesting:—

In 1870 Glasgow purchased its first steam fire engine. In 1871 two new manual engines were ordered. In 1872 other two steam fire engines were purchased, and have only recently been replaced after over 30 years' service. In the same year it was agreed to purchase horses for the Fire Department, and the resolution was put into effect in January, 1873.

The first of the electric street fire alarms was fitted up in 1878, and these were likewise the first to be used in Great Britain. In 1878 it was decided to convert the staff into a permanent one, and the staff soon after consisted of about 70 men and 50 police auxiliaries.

The subjoined table contains some features of interest as showing the progress within the tenure of office of the present Chief Officer of the Brigade:—

	Staff.	Horses.	Steam Fire Engines.	Manual Engines.	Hose and Ladder Cars.	Fire Escapes.
1884	127	11	3	15	6	1
1904	152	40	11	1	12	4

	Hand Reels.	Tool and General Purposes Carriages.	Butts.	Public Fire Alarms.	Private Fire Alarms.	Auto- matic Fire De- tectors.	Hose Yards.	Fire Cocks, &c.
1884	14	1	9	82	6	0	9,213	3,562
1904	2	7	0	236	46	32	17,640	6,373

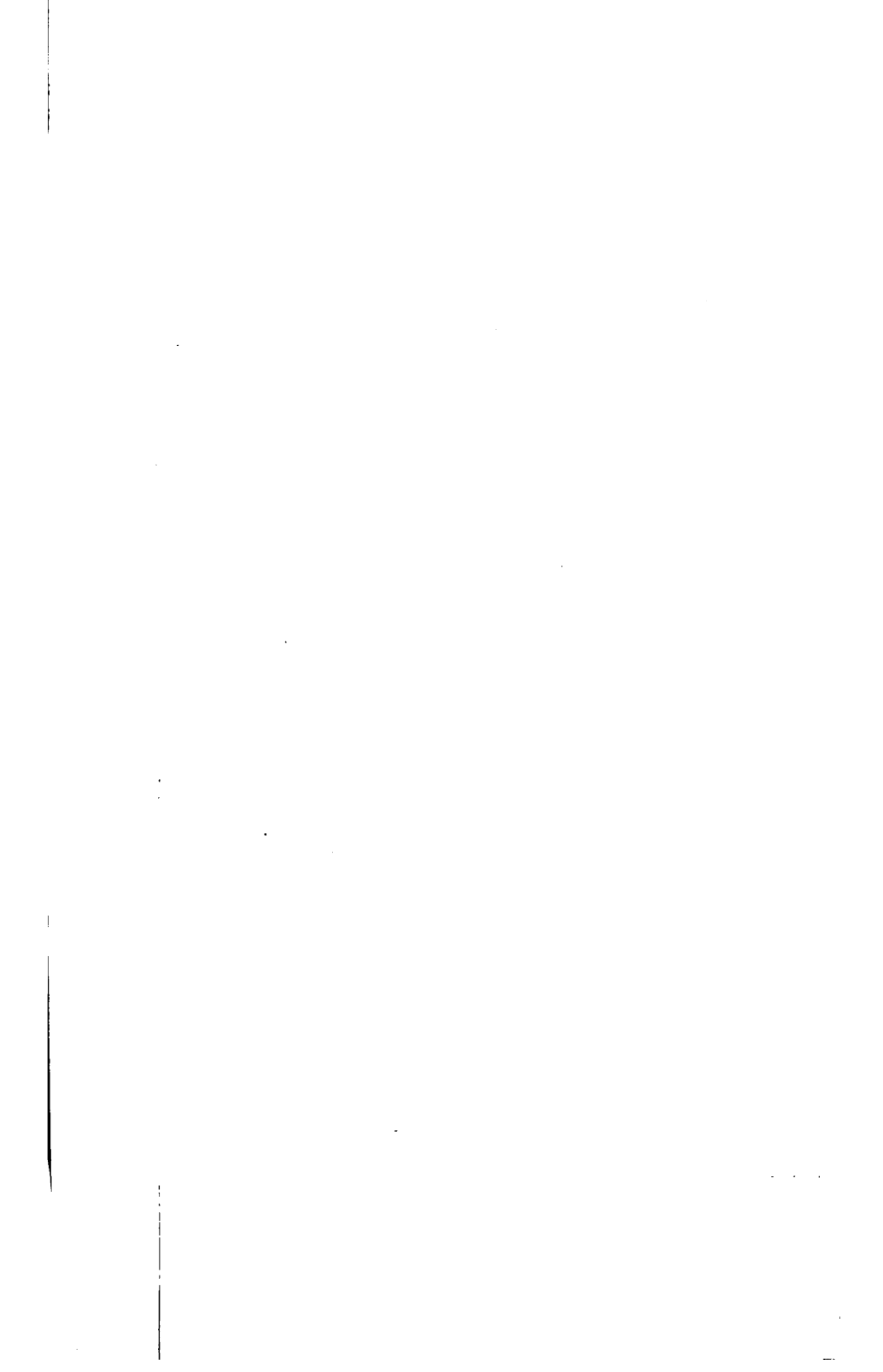
While the above shows the staff as 127 twenty years ago, 50 of that number were police constables, the permanent staff being thus 77. The services of the constables as firemen were dispensed with in 1891. The increase in the permanent staff during the last twenty years is 75, or nearly double, the increase in horses is 3·5, in steam fire engines 3·7, the hose carriages are doubled, fire escapes increased fourfold, tool and general purposes carriages increased sevenfold, public fire alarms about trebled, private fire alarms nearly eight times what they were, while the automatic fire detector is quite a recent feature; hose increased by 8,427 yards, and fire cocks, &c., increased by 2,811.

The decreases in plant are in manual engines, having only one in service; hand reels reduced from 14 to 2, only one of which is now in use, viz., the one at St. Enoch's Sub-Station.

The Corporation has dealt with the Fire Department on liberal lines. There are now only two buildings used as fire stations which were in service twenty years ago, viz., the Southern and Western District Stations. The new chief station in Ingram Street, costing about £70,000, was occupied in April, 1900.

The plant, horses, &c., are the best that can be got, and, with the exception of river and river-side fires, the equipment is ample. An additional station situated in the western portion of the Central District has been sanctioned. This is rendered necessary owing to the western trend of the business portion of the city and the large dimensions of the modern warehouse blocks.

The staff, which is principally composed of tradesmen, keep all stations in repair, construct all running plant (except steam fire engines). The electric street fire alarms (both inside and outside instruments), also all the fittings for the quick-hitching harness, are made and fixed up by the staff. The necessary helmets, belts, and boots are likewise made within their own workshops. The staff also undertake the inspection of all means of egress under the Factory and Workshop Acts.



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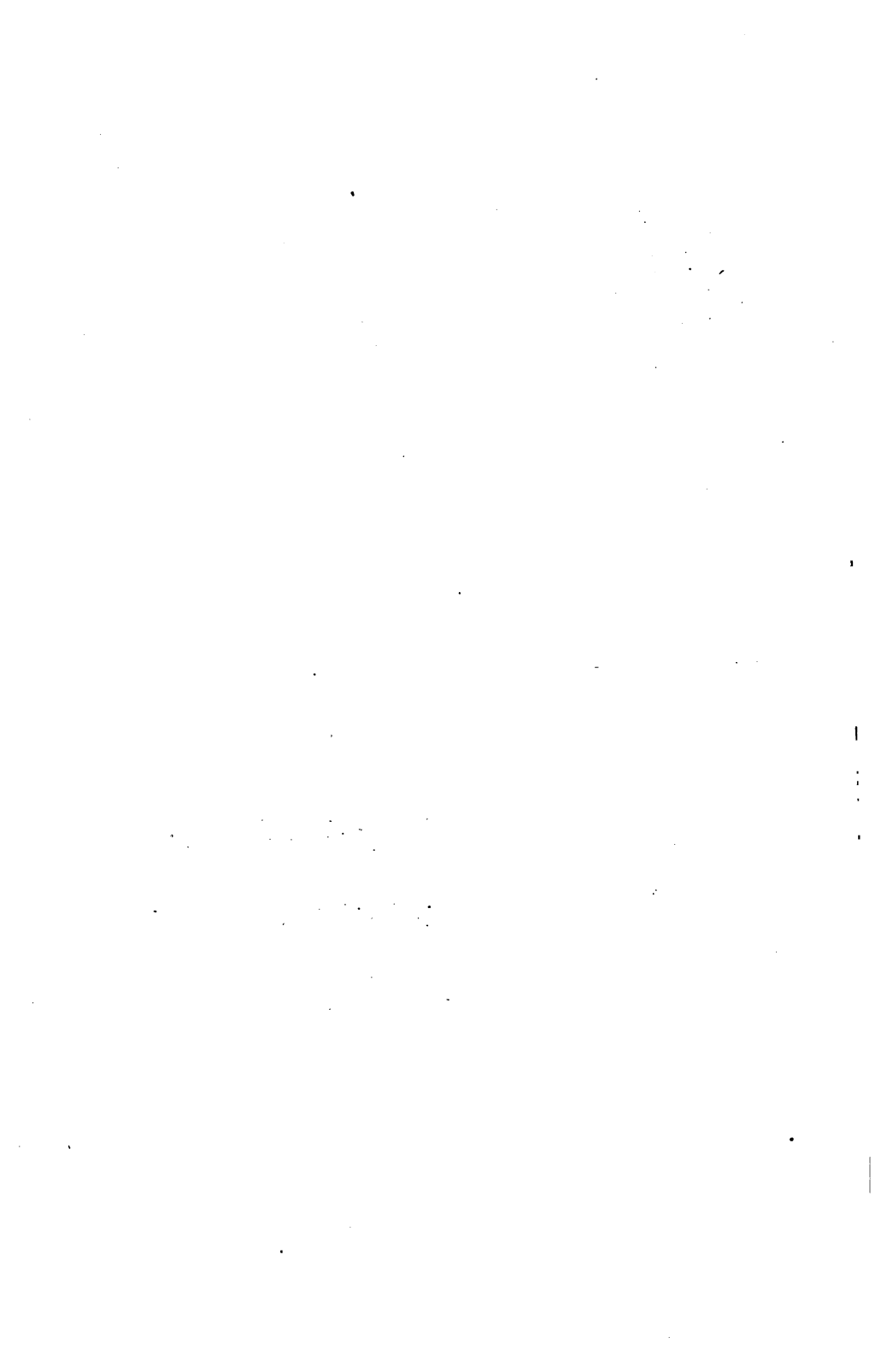
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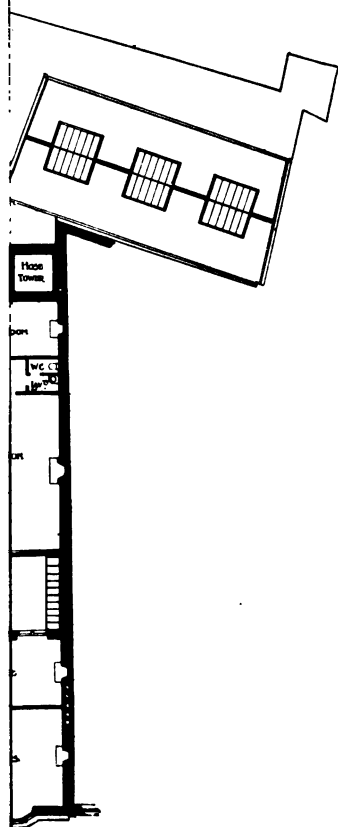
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The expenditure of the Fire Department twenty years ago was £8,400, and to-day it is over £21,000.

Glasgow, with a population of 780,000, has 152 firemen; Hamburg, with a population of 800,000, has 501 firemen; London, with a population of 4,600,000, has a brigade of 1,240; Chicago, with a population of 1,885,000, has 1,175 men.

Glasgow has one fireman to every	...	...	5,132
London	"	"	3,710
Chicago	"	"	1,604
Hamburg	"	"	1,600

The cost per head of the population is—

Glasgow,	...	...	...	...	£0	0	6 $\frac{1}{2}$
London,	...	...	...	...	0	1	0
Hamburg,	...	...	...	...	0	1	7 $\frac{1}{2}$
Chicago,	...	...	...	...	0	3	6

London has five times the number of fires and more than nine times the number of men that Glasgow has.

LIGHTING DEPARTMENT.

THE lighting of the streets of the city is regulated under the Glasgow Police Act, 1866, under which it is enacted that the Magistrates and Council shall make provision for lighting in a suitable manner the portions of the turnpike roads within the city, and the public and private streets and courts, and may with that object erect or continue and maintain upon the causeway or upon the foot pavements, or may affix to the walls of any buildings adjoining the said roads, streets, or courts, or to the railings in front of such buildings, or to the walls of any land or heritage adjoining the said roads or streets, the necessary lamps, lamp posts, lamp irons, and other appurtenances, and may from time to time alter the position of the said works, and may also provide for lighting the dial-plates of such clocks as to them shall seem proper, provided that they shall make compensation to the proprietor of any such buildings for any injury done by them to the same or to the railings in front thereof, to be recovered as damages.

Under the same Act, it is also enacted that the Inspector of Lighting shall be responsible to the Magistrates and Council for the proper erection, maintenance, and renewal of the said lamps, for the proper maintenance and renewal of any lamps now in use, for keeping in order all such lamps, for lighting them during such hours as the Magistrates and Council may from time to time direct, for the good conduct of the lamplighters and other persons appointed by him, and generally for the complete state of efficiency of his department.

In the year 1780 the first street lamps were erected, when the Magistrates of that day agreed to put up nine lamps on the south side of the Trongate, between the Tron Steeple and Stockwell Street, on condition that the proprietors made a footpath similar to that on the north side of the street.

Still further progress was made in the year 1817, when a company was formed in the city, with a capital of £40,000, for the production of gas. Shortly after this, in the year 1818, and following on the introduction of gas, the first gas lamp was lit. In the year 1859 the cost of gas for the public lighting of the city amounted to £6,437.

The Corporation, in 1869, acquired the works of the gas companies, and during the first year the Police Commissioners, who had charge of the lighting of the streets, paid to the Gas Commissioners the sum of £17,501 6s. 8d., of which sum £8,490 was for the lighting of the common stairs.

In the year 1877, the number of street lamps in use in the city was 5,155, each of which had a single jet burning 1 cubic foot per hour, but in 1878 these were changed to 2 cubic feet, the total number of lamps in that year being 7,196.

In 1895 the number of lamps in public streets was 13,672, and at the present time there are about 8,615 incandescent burners and 5,300 flat-flame burners in use.

Several of the streets of the city are lit by electric light, and the number of those at present in use is 799 arc lamps, of which 50 are $7\frac{1}{2}$ ampere, and the remainder are 10 ampere lamps.

Recently, however, the Corporation approved of a scheme for improving the lighting of the city generally, by changing all flat-flame burners to incandescent gas, and replacing present globes by lanterns, as a result of which it is hoped there will be a great improvement in the lighting of the city. It is estimated that the cost of replacing the present globes by lanterns, and the increased charge for gas, when the scheme is completed, will amount to about £8,000.

In the Police Act of 1862 powers were given to the Police Board to compel occupiers in common stairs to light the same during such hours as the Board should fix.

Under this power the Board took charge of those on the ground floor and not more than one stair up, the cost being paid by the contracting party, which was at the rate of 25s. per annum for each light. Those persons who lived on the upper flats required to contract with the Gas Company direct, or to light the flats from their own metres.

This arrangement was, however, found unsuitable, the time of the officials being taken up inquiring into complaints, and attending court as witnesses for the prosecution when the occupiers failed to light the stairs.

As a result of this the Board of that day applied in 1866 for power to take over the whole lighting of common stairs, and when the Act came into force the number of lights in use were 9,258. One year after the Act had been in operation, the number of lights was 15,335, while the number of lights at present in use is 59,473.

For the year just closed (1903-4) the amount paid for lighting common



GIRGENTI.—HOME FOR INEBRIATES.

stairs was £16,727 2s. 1d., the wage's bill amounting to £21,557 16s. 4d., or a total of £38,284 18s. 5d.

The consumpt of gas for the year 1903-4 was:

	Cubic feet.
Public lamps,	143,966,513
Private streets and courts,	35,852,186
Private lamps,	3,780,115
Barricade lamps,	138,177
Stair lights,	160,580,183
	<hr/>
	344,317,183
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INEBRIATES' REFORMATORY.

THE latest undertaking of the Corporation is the establishment of a home for the reception and treatment of inebriates. The Inebriates (Scotland) Act of 1898 empowers Town Councils and others to establish and maintain a certified inebriate reformatory, and on the 4th of April, 1899, the Corporation remitted to a special committee, to consider what steps should be taken with this view, and to report. After submitting their report the committee were authorised to lease or purchase suitable premises for an inebriate reformatory, and to obtain the sanction of the Secretary for Scotland to their proposals.

The committee, after examining a number of country houses, at last fixed upon the mansion-house and estate of Girgenti, in Ayrshire, which they purchased for £7,500. The house is distant 21 miles from the city, 4 miles from a town, stands 200 feet above sea level, is distant about 4 miles from the sea, and is open on every side. It is situated about 4 miles from Stewarton, from Kilwinning, and from Irvine, and $1\frac{1}{2}$ miles from Montgreenan and Cunningham Head Stations, on the Dalry and Kilmarnock line. The mansion-house consists of three storeys, including the basement storey, which is partly sunk. On the main flat are a large entrance hall and a large drawing-room (30 feet by 20 feet), large dining-room, and two bedrooms, with dressing rooms, store room, pantry, &c. On the upper flat are six bedrooms and two dressing rooms, box room, &c. On the basement there are kitchen, cook's room, scullery, wash-house, servants' hall, two bedrooms, lumber room and billiard room. Two staircases go from the top to the bottom of the house, and the basement is perfectly dry. There are two bath-rooms and lavatories, with earth closets. The outside offices are combined with a farm steading for the 55 acres of good arable land attached to the house. The offices consist of a two-stall stable, three loose boxes, coach-house, harness-room, and engine-house, with gas engine for pumping the water supply, gas-works, and joiner's shop. The steading consists of two byres (one for six cows and another for twenty), piggery, granary, boiler-houses, dairy, dwelling-house of room and kitchen, stable (four stalls), three barns of corrugated iron, sheep-house, and a number of other erections. The ground is well fenced,

and in good order. There is a walled-in garden of three-fourths of an acre, and there is a conservatory opening from the drawing-room. There are two lodges, consisting of room, kitchen, &c.

The water supply is obtained from a bore about 500 yards from the house, and the water is pumped to the house by means of a gas engine.

The house has been altered and rearranged to meet the requirements of an institution, and accommodation provided for twenty-eight male and thirty female inmates.

The Home was licensed by the Secretary for Scotland on 18th December last, and formally opened on 12th January, 1901.

Under the Inebriates Act the Corporation have the right to say whether or not they will admit a person remitted to the Home by the Sheriff, and the following conditions indicate the class of persons to be received as inmates:—

- “(1) The inmates must be persons belonging to Glasgow, and must be sent for trial to the Sheriff of Lanarkshire through one of the city Police Courts.
- “(2) Preference will be given in every case to persons who, while habitual drunkards, are of such character and disposition that it may be reasonably expected, if cured of their intemperance, they would be able to take their places in society as self-supporting citizens.
- “(3) The persons admitted must not be known thieves, or otherwise belonging to the criminal classes.
- “(4) In respect that other institutions are available for prostitutes, women of that class cannot be received.
- “(5) Persons suffering for infectious, contagious, or other serious disease cannot be received.”

The work on which the inmates will be employed will be, as regards the female inmates, a thorough training in household and laundry work, sewing, knitting, &c., with outdoor work in the lighter form of gardening, and also, in special cases, dairy work and poultry keeping; and, as regards the male inmates, they will be employed for a part of the day in any occupation which they may have previously followed, such as carpentry, shoemaking, painting, &c., for which facilities can be provided at the Home. All the male inmates will be trained in gardening or other outdoor work.

The following dietary for the Home has, with slight variation, been carried out:—

Breakfast.—Porridge and milk and tea, or coffee, or cocoa (only one of the three beverages to be provided each day); bread; butter (one ounce of margarine to be the maximum daily allowance, to include all meals). Such inmates as are usefully employed, and such inmates as the Medical Officer or Superintendent may consider it desirable should be supplied with an extra, may have one of the following supplied to them, viz.:—bacon, fish, eggs, cold pickled pork, or ham, bloaters, kippers, jam, it being understood that on any one morning only one of the above items is to be provided.



GIRGENTI.—HOME FOR INEBRIATES.

Dinner.—Four ounces of cooked meat without bone, potatoes and one other vegetable, and soup, fruit, or milk or other pudding (only one kind of pudding to be provided daily). Fish may be substituted for meat, and cheese for pudding, on certain days. Uncooked fruit may be given in season. Occasionally broth or other soup and pudding may be given instead of meat.

Tea.—Tea, with bread and butter or jam (see entry for breakfast).

Supper.—Milk, with bread and butter or jam; or porridge and milk, with bread and butter; or bread and milk, with salad when it is grown on the estate. Only one of the foregoing to be provided for any one night.

Up to the present time 35 inmates have been received. The institution is purely an experiment, and the erection and maintenance of an Inebriate Home on a much more extensive scale depends in large measure upon the success which it is hoped will attend the present venture.

WEIGHTS AND MEASURES DEPARTMENT.

THIS Department of the Corporation has been established primarily for the purpose of carrying out the Weights and Measures Acts. Though the organisation of the Department in its present form dates only from the year 1880, its inception may be said to date from the year 1821. At that period serious official attention was directed for the first time to the condition of the weights and measures used in the trade of the city.

It appears that in 1821 the weights and measures used in trade were so undefined that the Magistrates of the City had great difficulty in deciding on the particular weights and measures by which commodities should be sold. At that time it was the province of the Dean of Guild Court to take cognizance of weights and measures. The Court then authorised and instructed Mr. James Cleland, the Superintendent of Public Works for the City, to undertake the laborious task of adjusting the different weights and measures in use according to the legal standards, and of preparing a minute and accurate exemplification of all these different weights and measures. An appreciation of the great services rendered by Mr. Cleland in this connection is contained in the records of the Dean of Guild Court, under date 20th December, 1821. An important Act for ascertaining and establishing uniformity in weights and measures was passed in 1824, by which most of the present standards of weight and measure were defined, and the duty laid upon the Magistrates to procure standards. Some of the standards in the Weights and Measures Department of to-day bear the date of 1824, and their appearance indicates their superior quality and the care with which they have been kept.

The duties laid upon the Magistrates of the City by the Weights and Measures Act of 1824 were increased by another Act passed in 1835, and since that period they (the Magistrates) have been the authority for carrying into effect the Weights and Measures Acts. Shortly after this period special officers were appointed by the Magistrates of the City as Inspectors of Weights and Measures. These officers were for a time subordinate to the Chief Constable, but in 1880 the present Weights and Measures Department was established, with the late Mr. Hugh Richmond as its first Chief Inspector. Since that time the work has, chiefly owing to legislation, considerably increased. The change in the law which took place in 1889, requiring that every weighing instrument used for trade should be stamped, greatly multiplied and increased the importance of the inspectors' work. A technical knowledge is now requisite which was deemed unnecessary in the inspector of an earlier period. The Board of Trade must now be satisfied, on examination, that every inspector appointed by a Local Authority possesses sufficient practical knowledge for the performance of his duties.

In the Weights and Measures Department of the City there is a staff of seven inspectors, headed by a Chief Inspector, and an additional staff of sixteen assistants. Some idea of the scope of the Department's operations will be understood when it is pointed out that every place of business in the city where weights, measures, or weighing instruments of any kind are used for trade is expected to be visited by inspectors at least once a year, in order to ascertain that the provisions of the Weights and Measures Acts are being duly observed. These Acts provide that every weight, measure, or weighing instrument used in trade must be *just*, and require that every such weight, &c., shall, before being used for trade, be stamped by an Inspector of Weights and Measures. This applies to the large wagon weighbridge as well as to the tiny weight or measure by which medicines are sold, and much of the inspectors' time is taken up in the work of verifying and stamping. In addition, weights and measures in constant use require to be frequently adjusted, in consequence of wear and tear, and the Department undertakes the adjustment of weights and measures submitted for that purpose. It may be added that, according to the Acts, a weight, measure, or weighing instrument stamped by an Inspector of Weights and Measures in the United Kingdom is a legal weight, measure, or weighing instrument in any part of the United Kingdom, unless found to be false or unjust. The local inspectors have, therefore, to satisfy themselves as to the accuracy of any such weight, &c., which they may find in use in the trade of the city, and which bears the stamp of any other inspector in the United Kingdom. It follows, of course, that an inspector has to be specially careful in making his own tests before affixing his stamp. A weighing instrument, for example, bearing his stamp may be called in question in any part of the country in which it may be put into use.

The work of the staff is divided between out-door and in-door work, and the following figures summarise their operations in carrying out

the Weights and Measures Acts in the city during the past twenty years:—

OUT-DOOR WORK.

Year.	Inspections.	Weighing Instruments Examined.	Weights Examined.	Measures Examined.	Prosecutions.
1885	13,646	26,127	145,630	84,763	42
1886	11,203	21,627	119,600	62,538	47
1887	10,724	20,799	114,333	64,737	48
1888	7,522	16,870	88,991	13,779	38
1889	11,306	22,706	129,207	60,279	47
1890	7,109	13,698	73,888	39,020	41
1891	1,484	3,369	20,511	1,077	...
1892	7,171	15,432	86,381	14,938	44
1893	8,773	15,807	91,240	42,114	26
1894	11,937	27,377	123,046	61,948	37
1895	12,300	21,757	123,522	56,553	23
1896	11,858	20,711	115,255	48,569	8
1897	10,938	18,731	106,341	46,196	52
1898	8,926	16,775	94,202	18,793	25
1899	6,935	13,014	71,550	16,490	16
1900	7,605	13,025	69,085	31,056	22
1901	7,945	13,543	72,808	26,925	18
1902	10,083	17,511	94,870	24,884	8
1903	7,117	11,324	61,619	26,737	18
1904	11,941	18,443	97,238	33,809	26

IN-DOOR WORK.

Year.	Weights Stamped.	Measures Stamped.	Weighing Instruments Stamped.	Weights Adjusted.	Measures Adjusted.	Fees Drawn.		
						£	s.	d.
1885	68,616	16,445	...	59,615	2,288	1,043	1	7
1886	63,921	11,151	...	55,233	1,875	990	8	11
1887	67,607	11,573	...	59,424	1,764	1,081	11	0
1888	58,647	11,284	...	51,689	1,047	937	13	11
1889	62,516	12,301	...	58,580	1,454	1,036	2	5
1890	56,173	14,271	...	49,769	1,703	1,035	1	2
1891	52,114	15,539	18,189*	43,779	2,445	1,414	19	2
1892	69,536	16,187	11,097	57,993	3,798	1,478	10	7
1893	67,578	21,313	7,816	56,061	9,040	1,464	14	10
1894	76,941	18,590	8,230	64,092	6,803	1,522	10	7
1895	72,301	14,054	7,983	59,515	3,540	1,336	12	10
1896	71,425	16,190	7,633	61,568	3,644	1,333	17	0
1897	65,635	16,813	7,176	55,563	3,736	1,266	8	11
1898	67,066	17,831	5,916	54,891	2,121	1,193	12	2
1899	57,956	13,918	5,671	50,285	2,420	1,075	10	5
1900	60,603	13,274	6,256	53,315	4,706	1,213	5	8
1901	62,956	21,654	6,373	57,395	3,270	1,234	1	6
1902	74,982	34,580	6,448	62,042	3,079	1,367	18	1
1903	72,077	80,689	6,806	53,037	3,789	1,510	2	7
1904	79,638	75,032	7,055	62,074	2,675	1,552	18	4

* The Act requiring that weighing instruments should be stamped was passed in 1889.

The inspectors of the Department also carry out the clauses in the local Police Acts which relate to the use of weights and measures. These Acts contain special provisions as to the sale of coal and bread, and to the weight of made-up parcels of goods. During the past few years increased attention has been devoted to this branch of work, with results which are of considerable advantage to the citizens.

The following figures show a year's work in this branch:—

SALE OF COAL.

Number of inspections of vehicles carrying coal for sale or delivery to purchasers, ...	116
Number of persons or firms reported for infringements of Acts, ...	14
Number of persons or firms prosecuted where convictions followed, ...	12
Amount of penalties imposed by Magistrates, £4	9 6

SALE OF BREAD.

Number of inspections with reference to the weight of bread, ...	176
Number of infringements of Act reported, ...	1
Number of persons or firms prosecuted, ...	1
Amount of penalties imposed by Magistrates, £2	0 0

WEIGHING OF MADE-UP PARCELS.

Number of inspections in shops with reference to checking the weight of made-up parcels, ...	246
Number of infringements of Act reported, ...	3
Number of persons or firms prosecuted where convictions followed, ...	2
Amount of penalties imposed by Magistrates, £4	4 0

The carrying out of the Petroleum Acts is another branch of the Department's work. These Acts make provision for the safe keeping of petroleum spirit and other substances of a like nature.

Each inspector of the Department is appointed an Officer under the Petroleum Acts, and gives attention, while carrying out his primary weights and measures duties, to secure that petroleum spirit is not kept in premises without a license first being obtained from the Magistrates, and that these dangerous substances are handled in a careful and proper manner.

During the year ending 31st May, 1903, there were 262 licenses granted by the Magistrates for keeping liquid petroleum, referring to a total quantity of 75,325½ gallons. There were also six licenses granted for the storage of carbide of calcium. Great care is exercised in securing proper conditions of storage before granting licenses, and the fact that only one fatal accident occurred in connection with the handling of petroleum during the year referred to, and in that instance to petroleum which did not come within the operation of the Acts, goes to show that the beneficial aim of these Acts is being attained.

LABOUR BUREAU AND SERVANTS' REGISTRY.

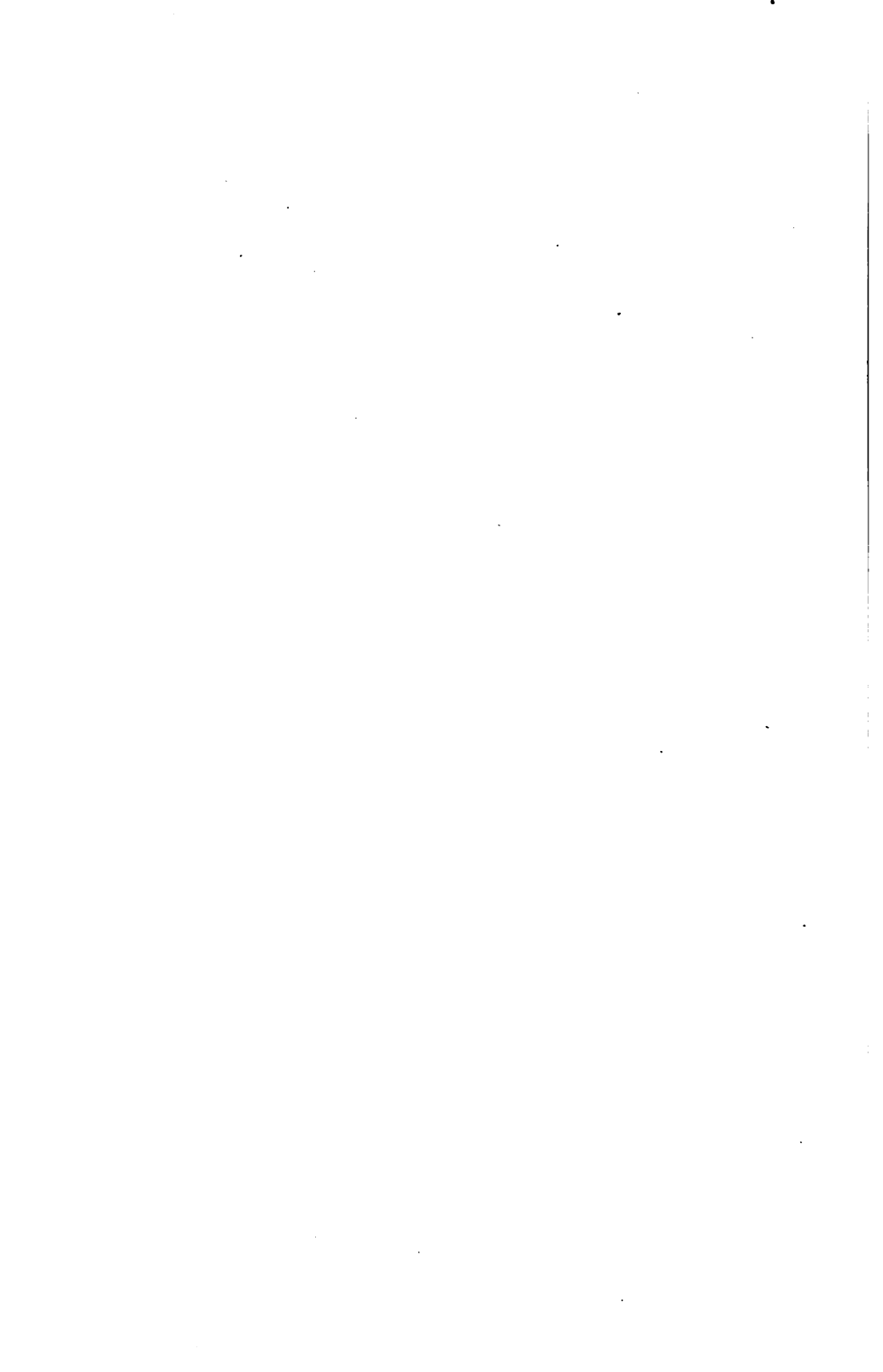
THIS Department of the public service was opened on 4th August, 1896. The Bureau has been established by the Corporation for the registration of workers of every kind, and to provide an easy and convenient means of bringing together employers and persons of both sexes in search of either permanent or temporary work. There are no fees payable by either the employer or the worker. The Corporation, while accepting no responsibility in connection with applicants, endeavours to assure themselves of the character of those whom they send to any situation. Since its inception the progress of the Bureau has been steady and continuous, as will be seen from the following tables:—

TABLE SHOWING WORK FOR LAST SEVEN YEARS.

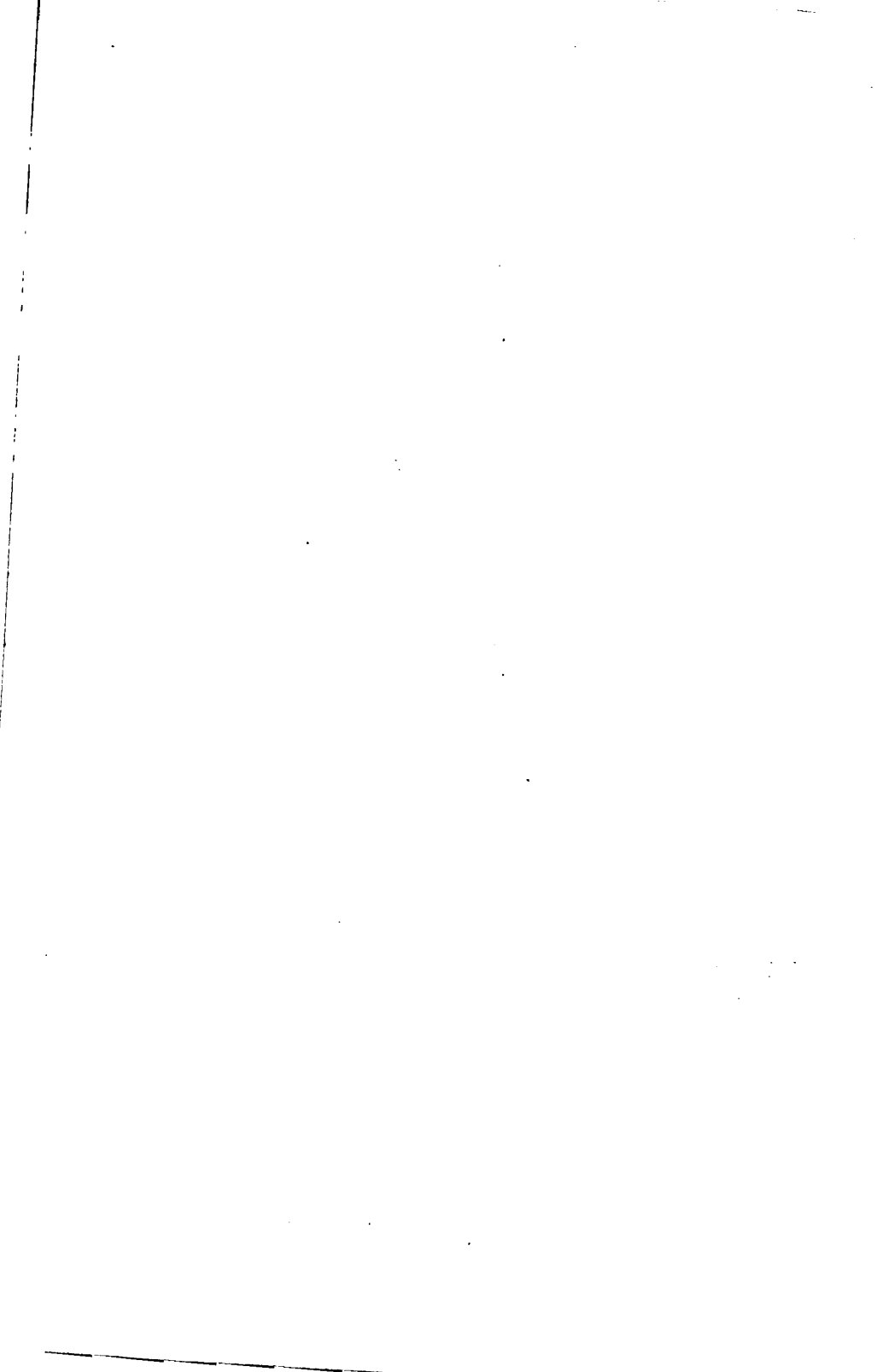
YEAR.	Number Registered.	Number of Permanent Situations Offered.	NUMBER WHO FOUND WORK.		Total Number who found Work.	Percentage of those Registered who obtained Employment.	Annual Cost.	APPROXIMATE COST PER HEAD.			
			Private Employers.	Local Authorities				Of Number Registered.	Of Persons who found Work.	Of Persons Registered and Situations Offered.	
1897,	3,818	1,175	814	30	844	22.1	£ 250	s. d. 1 3½	s. d. 5 11	s. d. 1 0	
1898,	4,784	1,816	1,276	183	1,459	30.5	216	0 10½	2 11½	0 7½	
1899,	4,365	1,920	1,515	59	1,574	36.28	237	1 1	3 0	0 9	
1900,	5,224	2,278	2,089	101	2,190	42.3	240	0 9½	2 11½	0 7	
1901,	5,696	2,048	2,045	134	2,179	38.2	248	0 10½	2 3½	0 7½	
1902,	5,884	1,926	2,023	67	2,090	35.57	267	0 10½	2 6½	0 8	
1903.	5,873	1,859	2,174	64	2,238	38.1	301	1 0½	2 8½	0 5½	

	1903.					1902.				
	Permanent.		Temporary.		Total.	Permanent.		Temporary.		Total.
Applications by Private Employers during the year, ...	Male.	Female.	Male.	Female.		Male.	Female.	Male.	Female.	
Do. Corporation Departments, ...	247	1405	95	4640	6387	235	1517	80	3937	5769
	36	15	8	...	59	31	21	11	...	63
	283	1420	103	4640	6446	266	1538	91	3937	5833
Number of Situations offered—	Permanent.		Temporary.		Total.	Permanent.		Temporary.		Total.
For Men, ...	236	171	407	...		199	121	320	...	
„ Lads and Boys,	121	2	123	...	...	120	3	123	...	...
„ Women, ...	1315	4763	6078	...	...	1384	4003	5387	...	...
„ Girls under 18,	187	...	187	...	...	259	...	259	...	...
	1859	4936	6795	...	...	1962	4127	6089	...	...

Regarding the males registered, almost every variety of occupation is included, excepting a few of the highly-skilled trades; these are occasionally represented. During the last four years the average number of different occupations under which males have been registered was 141, and the average number of different occupations in which situations were obtained by males through the Bureau was 39. The female division of the work is very largely confined to the various classes of domestic servants.







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